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Boston, June 1817.

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DISSERTATION FIRST:

EXHIBITING A GENERAL VIEW OF THE

Progress of Metaphysical, Ethical, and
Political Philosophy,

SINCE THE REVIVAL OF LETTERS IN EUROPE.

✓
BY DUGALD STEWART, Esq.

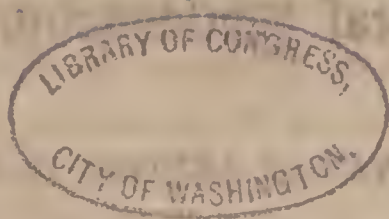
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PREFACE

TO THE

FIRST DISSERTATION,

CONTAINING SOME CRITICAL REMARKS ON THE DISCOURSE PREFIXED
TO THE FRENCH ENCYCLOPÉDIE.

WHEN I ventured to undertake the task of contributing a Preliminary Dissertation to these Supplemental Volumes of the *Encyclopædia Britannica*, my original intention was, after the example of D'Alembert, to have begun with a general survey of the various departments of human knowledge. The outline of such a survey, sketched by the comprehensive genius of Bacon, together with the corrections and improvements suggested by his illustrious disciple, would, I thought, have rendered it comparatively easy to adapt their intellectual map to the present advanced state of the sciences; while the unrivalled authority which their united work has long maintained in the republic of letters, would, I flattered myself, have softened those criticisms which might be expected to be incurred by any similar attempt of a more modern hand. On a closer examination, however, of their labours, I found myself under the necessity of abandoning this design. Doubts immediately occurred to me with respect to the justness of their logical views, and soon terminated in a conviction, that these views are radically and essentially erroneous. Instead, therefore,

of endeavouring to give additional currency to speculations which I conceived to be fundamentally unsound, I resolved to avail myself of the present opportunity to point out their most important defects ;—defects which, I am nevertheless very ready to acknowledge, it is much more easy to remark than to supply. The critical strictures which, in the course of this discussion, I shall have occasion to offer on my predecessors, will, at the same time, account for my forbearing to substitute a new map of my own, instead of that to which the names of Bacon and D'Alembert have lent so great and so well-merited a celebrity ; and may perhaps suggest a doubt, whether the period be yet arrived for hazarding again, with any reasonable prospect of success, a repetition of their bold experiment. For the length to which these strictures are likely to extend, the only apology I have to offer is the peculiar importance of the questions to which they relate, and the high authority of the writers whose opinions I presume to controvert.

Before entering on his main subject, D'Alembert is at pains to explain a distinction, which he represents as of considerable importance—between the Genealogy of the sciences, and the Encyclopedical arrangement of the objects of human knowledge.¹ “In examining the former,” he observes, “our aim is, by remounting to the origin and genesis of our ideas, to trace the causes to which the sciences owe their birth ; and to mark the characteristic by which they are distinguished from each other. In order to ascertain the latter, it is necessary to comprehend, in one general *scheme*, all the various departments of study ; to arrange them into proper classes ; and to point out their mutual relations and dependencies.” Such a *scheme* is sometimes

¹ “Il ne faut pas confondre l'ordre Encyclopédique des connoissances humaines avec la Généalogie des Sciences.” *Avertissement*, p. 7.

likened by D'Alembert to a map or chart of the intellectual world ; sometimes to a Genealogical¹ or Encyclopedical Tree, indicating the manifold and complicated affinities of those studies, which, however apparently remote and unconnected, are all the common offspring of the human understanding. For executing successfully this chart or tree, a philosophical delineation of the natural progress of the mind may (according to him) furnish very useful lights ; although he acknowledges that the results of the two undertakings cannot fail to differ widely in many instances,—the laws which regulate the generation of our ideas often interfering with that systematical order in the relative arrangement of scientific pursuits, which it is the purpose of the Encyclopedical Tree to exhibit.²

In treating of the first of these subjects, it cannot be denied, that D'Alembert has displayed much ingenuity and

¹ It is to be regretted, that the epithet *Genealogical* should have been employed on this occasion, where the author's wish was to contradistinguish the idea denoted by it, from that historical view of the sciences to which the word *Genealogy* had been previously applied.

² The true reason of this might perhaps have been assigned in simpler terms, by remarking, that the order of invention is, in most cases, the reverse of that fitted for didactic communication. This observation applies not only to the analytical and synthetical processes of the *individual* ; but to the progressive improvements of the *species*, when compared with the arrangements prescribed by logical method, for conveying a knowledge of them to students. In an enlightened age, the sciences are justly considered as the basis of the arts ; and, in a course of liberal education, the former are always taught prior to the latter. But, in the order of invention and discovery, the arts preceded the sciences. Men measured land before they studied speculative geometry ; and governments were established before politicks were studied as a science. A remark somewhat similar is made by Celsus, concerning the history of medicine : “ Non medicinam rationi esse posteriorem, sed post medicinam inventam, rationem esse quæsitam.”

invention ; but the depth and solidity of his general train of thought may be questioned. On various occasions, he has evidently suffered himself to be misled by a spirit of false refinement ; and on others, where probably he was fully aware of his inability to render the theoretical chain complete, he seems to have aimed at concealing from his readers the faulty links, by availing himself of those epigrammatic points, and other artifices of style, with which the genius of the French language enables a skilful writer to smooth and varnish over his most illogical transitions.

The most essential imperfections, however, of this historical sketch, may be fairly ascribed to a certain vagueness and indecision in the author's idea, with regard to the scope of his inquiries. What he has in general pointed at, is to trace, from the theory of the Mind, and from the order followed by nature in the development of its powers, the successive steps by which the curiosity may be conceived to have been gradually conducted from one intellectual pursuit to another ; but, in the execution of this design (which in itself is highly philosophical and interesting,) he does not appear to have paid due attention to the essential difference between the history of the human species, and that of the civilized and inquisitive individual. The former was undoubtedly that which principally figured in his conceptions ; and to which, I apprehend, he ought to have confined himself exclusively ; whereas, in fact, he has so completely blended the two subjects together, that it is often impossible to say which of them was uppermost in his thoughts. The consequence is, that, instead of throwing upon either those strong and steady lights, which might have been expected from his powers, he has involved both in additional obscurity. This indistinctness is more peculiarly remarkable in the beginning of his Discourse, where he represents men in the earliest infancy of science, before

they had time to take any precautions for securing the means of their subsistence, or of their safety,—as philosophizing on their sensations,—on the existence of their own bodies,—and on that of the material world. His Discourse, accordingly, sets out with a series of Meditations, precisely analogous to those which form the introduction to the philosophy of Descartes ; meditations which, in the order of time, have been uniformly posterior to the study of external nature ; and which, even in such an age as the present, are confined to a comparatively small number of re-cluse metaphysicians.

Of this sort of *conjectural* or *theoretical* history, the most unexceptionable specimens which have yet appeared, are indisputably the fragments in Mr. Smith's posthumous work on the History of Astronomy, and on that of the Ancient Systems of Physicks and Metaphysicks. That, in the latter of these, he may have occasionally accommodated his details to his own peculiar opinions concerning the object of Philosophy, may perhaps, with some truth, be alleged ; but he must at least be allowed the merit of completely avoiding the error by which D'Alembert was misled ; and, even in those instances where he himself seems to wander a little from the right path, of furnishing his successors with a thread, leading by easy and almost insensible steps, from the first gross perceptions of sense, to the most abstract refinements of the Grecian schools. Nor is this the only praise to which these fragments are entitled. By seizing on the different points of view from whence the same object was contemplated by different sects, they often bestow a certain degree of unity and of interest on what before seemed calculated merely to bewilder and to confound ; and render the apparent aberrations and caprices of the understanding, subservient to the study of its operations and laws.

To the foregoing strictures on D'Alembert's view of the origin of the sciences, it may be added, that this introductory part of his Discourse does not seem to have any immediate connexion with the sequel. We are led, indeed, to expect, that it is to prepare the way for the study of the Encyclopedical Tree afterwards to be exhibited ; but in this expectation we are completely disappointed ;—no reference to it whatever being made by the author in the farther prosecution of his subject. It forms, accordingly, a portion of his Discourse altogether foreign to the general design ; while, from the metaphysical obscurity which pervades it, the generality of readers are likely to receive an impression, either unfavourable to the perspicuity of the writer, or to their own powers of comprehension and of reasoning. It were to be wished, therefore, that, instead of occupying the first pages of the *Encyclopédie*, it had been reserved for a separate article in the body of that work. There it might have been read by the logical student, with no small interest and advantage ; for, with all its imperfections, it bears numerous and precious marks of its author's hand.

In delineating his Encyclopedical Tree, D'Alembert has, in my opinion, been still more unsuccessful than in the speculations which have been hitherto under our review. His veneration for Bacon seems, on this occasion, to have prevented him from giving due scope to his own powerful and fertile genius, and has engaged him in the fruitless task of attempting, by means of arbitrary definitions, to draw a veil over incurable defects and blemishes. In this part of Bacon's logick, it must, at the same time, be owned, that there is something peculiarly captivating to the fancy ; and, accordingly, it has united in its favour the suffrages of almost all the succeeding authors who have treated of the same subject. It will be necessary for me, therefore, to

explain fully the grounds of that censure, which, in opposition to so many illustrious names, I have presumed to bestow on it.

Of the leading ideas to which I more particularly object, the following statement is given by D'Alembert. I quote it in preference to the corresponding passage in Bacon, as it contains various explanatory clauses and glosses, for which we are indebted to the ingenuity of the commentator.

“The objects about which our minds are occupied, are either spiritual or material, and the media employed for this purpose are our ideas, either directly received, or derived from reflection. The system of our direct knowledge consists entirely in the passive and mechanical accumulation of the particulars it comprehends; an accumulation which belongs exclusively to the province of Memory. Reflection is of two kinds, according as it is employed in reasoning on the objects of our direct ideas, or in studying them as models for imitation.

“Thus, Memory, Reason, strictly so called, and Imagination, are the three modes in which the mind operates on the subjects of its thoughts. By Imagination, however, is here to be understood, not the faculty of conceiving or representing to ourselves what we have formerly perceived, a faculty which differs in nothing from the memory of these perceptions, and which, if it were not relieved by the invention of signs, would be in a state of continual exercise. The power which we denote by this name has a nobler province allotted to it, that of rendering imitation subservient to the creations of genius.

“These three faculties suggest a corresponding division of human knowledge into three branches, 1, History, which derives its materials from Memory; 2, Philosophy, which is the product of Reason; and 3, Poetry (compre-

hending under this title all the Fine Arts,) which is the offspring of Imagination. ¹ If we place Reason before Imagination, it is because this order appears to us conformable to the natural progress of our intellectual operations. ² The Imagination is a creative faculty, and the mind, before it attempts to create, begins by reasoning upon what it sees and knows. Nor is this all. In the faculty of Imagination, both Reason and Memory are, to a certain extent, combined,—the mind never imagining or creating objects but such as are analogous to those whereof it has had previous experience. Where this analogy is wanting, the combinations are extravagant and displeasing; and, consequently, in that agreeable imitation of nature, at which the fine arts aim in common, invention is necessarily subjected to the control of rules which it is the business of the philosopher to investigate.

“In farther justification of this arrangement, it may be remarked, that Reason, in the course of its successive

¹ The latitude given by D’Alembert to the meaning of the word *Poetry* is a real and very important improvement on Bacon, who restricts it to fictitious History or Fables. (*De Aug. Scient. Lib. ii. cap. i.*) D’Alembert, on the other hand, employs it in its natural signification, as synonymous with *invention* or *creation*. “La Peinture, la Sculpture, l’Architecture, la Poésie, la Musique, et leurs différentes divisions, composent la troisième distribution générale qui naît de l’Imagination, et dont les parties sont comprises sous le nom de Beaux-Arts. On peut les rapporter tous à la Poésie, en prenant ce mot dans sa signification naturelle, qui n’est autre chose qu’invention ou création.”

² In placing Reason before Imagination, D’Alembert departs from the order in which these faculties are arranged by Bacon. “Si nous n’avons pas placé, comme lui, la Raison après l’Imagination, c’est que nous avons suivi, dans le système Encyclopédique, l’ordre métaphysique des opérations de l’esprit, plutôt que l’ordre historique de ses progrès depuis la renaissance des lettres.”—(*Disc. Prelim.*) How far the motive here assigned for the change is valid, the reader will be enabled to judge from the sequel of the above quotation.

operations on the subjects of thought, by creating abstract and general ideas, remote from the perceptions of sense, leads to the exercise of Imagination as the last step of the process. Thus metaphysicks and geometry are, of all the sciences belonging to Reason, those in which Imagination has the greatest share. I ask pardon for this observation from those men of taste, who, little aware of the near affinity of geometry to their own pursuits, and still less suspecting that the only intermediate step between them is formed by metaphysicks, are disposed to employ their wit in depreciating its value. The truth is, that, to the geometer who invents, Imagination is not less essential than to the poet who creates. They operate, indeed, differently on their object, the former abstracting and analyzing, where the latter combines and adorns;—two processes of the mind, it must, at the same time, be confessed, which seem from experience to be so little congenial, that it may be doubted if the talents of a great geometer and of a great poet will ever be united in the same person. But, whether these talents be, or be not mutually exclusive, certain it is, that they who possess the one, have no right to despise those who cultivate the other. Of all the great men of antiquity, Archimedes is perhaps he who is the best entitled to be placed by the side of Homer.”

D’Alembert afterwards proceeds to observe, that of these three general branches of the Encyclopedical Tree, a natural and convenient subdivision is afforded by the metaphysical distribution of things into Material and Spiritual. “With these two classes of existences,” he observes farther, “history and philosophy are equally conversant; but *as for the Imagination, her imitations are entirely confined to the material world*;—a circumstance,” he adds, “which conspires with the other arguments above stated, in justifying Bacon for assigning to her the last

place in his enumeration of our intellectual faculties.”¹ Upon this subdivision he enlarges at some length, and with considerable ingenuity ; but on the present occasion it would be quite superfluous to follow him any farther, as more than enough has been already quoted to enable my readers to judge, whether the objections which I am now to state to the foregoing extracts be as sound and decisive as I apprehend them to be.

Of these objections a very obvious one is suggested by a consideration, of which D’Alembert himself has taken notice,—that the three faculties to which he refers the whole operations of the understanding are perpetually blended together in their actual exercise, insomuch that there is scarcely a branch of human knowledge which does not, in a greater or less degree, furnish employment to them all. It may be said, indeed, that some pursuits exercise and invigorate particular faculties *more* than others ; that the study of History, for example, although it may occasionally require the aid both of Reason and of Imagination, yet chiefly furnishes occupation to the Memory ; and that this is sufficient to justify the logical division of our mental powers as the groundwork of a corresponding Encyclopedical classification.² This, however, will be found more

¹ In this exclusive limitation of the province of Imagination to things Material and Sensible, D’Alembert has followed the definition given by Descartes in his second Meditation ; “ *Imaginari nihil aliud est, quam rei corporeæ figuram seu imaginem contemplari* ;”—a power of the mind, which (as I have elsewhere observed) appears to me to be most precisely expressed in our language by the word *Conception*. The province assigned to Imagination by D’Alembert is more extensive than this, for he ascribes to her also a creative and combining power ; but still his definition agrees with that of Descartes, inasmuch as it excludes entirely from her dominion both the intellectual and the moral worlds.

² I allude here to the following apology for Bacon, suggested by a very learned and judicious writer :—

specious than solid. In what respects is the faculty of Memory more essentially necessary to the student of history than to the philosopher or to the poet; and, on the other hand, of what value, in the circle of the sciences, would be a collection of historical details, accumulated without discrimination, without a scrupulous examination of evidence, or without any attempt to compare and to generalize? For the cultivation of that species of history, in particular, which alone deserves a place in the Encyclopedical Tree, it may be justly affirmed, that the rarest and most comprehensive combination of all our mental gifts is indispensably requisite.

Another, and a still more formidable objection to Bacon's classification, may be derived from the very imperfect and partial analysis of the mind which it assumes as its basis. Why were the powers of Abstraction and Generalization passed over in silence?—powers which, according as they are cultivated or neglected, constitute the most essential of all distinctions between the intellectual characters of individuals. A corresponding distinction, too, not less important, may be remarked among the objects of human study, according as our aim is to treasure up particular facts, or to establish general conclusions. Does not this distinction mark out, with greater precision, the limits which separate philosophy from mere historical narrative, than that which turns upon the different provinces of Reason and of Memory?

“On a fait cependant à Bacon quelques reproches assez fondés. On a observé que sa classification des sciences repose sur une distinction qui n'est pas rigoureuse, puisque la mémoire, la raison, et l'imagination concourent nécessairement dans chaque art, comme dans chaque science. Mais on peut répondre, que l'un ou l'autre de ces trois facultés, quoique secondée par les deux autres, peut cependant jouer le rôle principal. En prenant la distinction de Bacon dans ce sens, sa classification reste exacte, et devient très utile.”—(Degerando, *Hist. Comp.* Tome I, p. 298.)

I shall only add one other criticism on this celebrated enumeration, and that is, its want of distinctness, in confounding together the Sciences and the Arts under the same general titles. Hence a variety of those capricious arrangements, which must immediately strike every reader who follows Bacon through his details; the reference, for instance, of the Mechanical arts to the department of History; and consequently, according to his own analysis of the Mind, the ultimate reference of these arts to the faculty of Memory: while, at the same time, in his tripartite division of the whole field of human knowledge, the art of Poetry has one entire province allotted to itself.

These objections apply in common to Bacon and to D'Alembert. That which follows has a particular reference to a passage already cited from the latter, where, by some false refinements concerning the nature and functions of Imagination, he has rendered the classification of his predecessor incomparably more indistinct and illogical than it seemed to be before.

That all the creations, or new combinations of Imagination, imply the previous process of decomposition or analysis, is abundantly manifest; and, therefore, without departing from the common and popular use of language, it may undoubtedly be said, that the faculty of abstraction is not less essential to the Poet, than to the Geometer and the Metaphysician.¹ But this is not the doctrine of D'Alem-

¹ This assertion must, however, be understood with some qualifications; for, although the Poet, as well as the Geometer and the Metaphysician, be perpetually called upon to decompose, by means of abstraction, the complicated objects of perception, it must not be concluded that the abstractions of all the three are exactly of the same kind. Those of the Poet amount to nothing more than to a separation into parts of the realities presented to his senses; which separation is only a preliminary step to a subsequent recomposition into new and ideal forms of the things abstracted; whereas the abstractions of the Metaphysician and of the Geometer form the very objects of their respective sciences.

bert. On the contrary, he affirms, that Metaphysics and Geometry are, of all the sciences connected with reason, those in which Imagination has the greatest share ; an assertion which, it will not be disputed, has at first sight somewhat of the air of a paradox ; and which, on closer examination, will, I apprehend, be found altogether inconsistent with fact. If indeed D'Alembert had, in this instance, used (as some writers have done) the word Imagination as synonymous with Invention, I should not have thought it worth while (at least so far as the geometer is concerned) to dispute his proposition. But that this was not the meaning annexed to it by the author, appears from a subsequent clause, where he tells us, that the most refined operations of reason, consisting in the creation of *generals* which do not fall under the cognizance of our senses, naturally lead to the exercise of imagination. His doctrine, therefore, goes to the identification of Imagination with Abstraction ; two faculties so very different in the direction which they give to our thoughts, that (according to his own acknowledgment) the man who is habitually occupied in exerting the one, seldom fails to impair both his capacity and his relish for the exercise of the other.

This identification of two faculties, so strongly contrasted in their characteristical features, was least of all to be expected from a logician, who had previously limited the province of Imagination to the imitation of material objects ; a limitation, it may be remarked in passing, which is neither sanctioned by common use, nor by just views of the philosophy of the Mind. Upon what ground can it be alleged, that Milton's portrait of Satan's intellectual and moral character was not the offspring of the same creative faculty which gave birth to his Garden of Eden ? After such a definition, however, it is difficult to conceive, how so very acute a writer should have referred to imagination the abstractions of the geometer and of the metaphysician ;

and still more, that he should have attempted to justify this reference, by observing, that these abstractions do not fall under the cognizance of the senses. My own opinion is, that, in the composition of the whole passage, he had a view to the unexpected parallel between Homer and Archimedes, with which he meant, at the close, to surprise his readers.

If the foregoing strictures be well founded, it seems to follow, not only that the attempt of Bacon and of D'Alembert, to classify the sciences and arts according to a logical division of our faculties, is altogether unsatisfactory; but that every future attempt of the same kind may be expected to be liable to similar objections. In studying, indeed, the Theory of the Mind, it is necessary to push our analysis as far as the nature of the subject admits of; and, wherever the thing is possible, to examine its constituent principles separately and apart from each other: but this consideration itself, when combined with what was before stated on the endless variety of forms in which they may be blended together in our various intellectual pursuits, is sufficient to show how ill adapted such an analysis must forever remain to serve as the basis of an Encyclopedical distribution.¹

¹ In justice to the authors of the Encyclopedical Tree prefixed to the French Dictionary, it ought to be observed, that it is spoken of by D'Alembert, in his Preliminary Discourse, with the utmost modesty and diffidence; and that he has expressed, not only his own conviction, but that of his colleague, of the impossibility of executing such a task in a manner likely to satisfy the publick. “*Nous sommes trop convaincus de l'arbitraire qui régnera toujours dans une pareille division, pour croire que notre système soit l'unique ou le meilleure; il nous suffira que notre travail ne soit pas entièrement désapprouvé par les bons esprits.*”) And, some pages afterwards, “*Si le public éclairé donne son approbation à ces changemens, elle sera la recompense de notre docilité; et s'il ne les approuve pas, nous n'en serons que plus convaincus de l'impossibilité de former un Arbre Encyclopédique qui soit au gré de tout le monde.*”

The circumstance to which this part of Bacon's philosophy is chiefly indebted for its popularity, is the specious simplicity and comprehensiveness of the distribution itself;—not the soundness of the logical views by which it was suggested. That all our intellectual pursuits may be referred to one or other of these three heads, History, Philosophy, and Poetry, may undoubtedly be said with considerable plausibility; the word History being understood to comprehend all our knowledge of particular facts and particular events; the word Philosophy, all the general conclusions or laws inferred from these particulars by induction; and the word Poetry, all the arts addressed to the Imagination. Not that the enumeration, even with the help of this comment, can be considered as complete, for (to pass over entirely the other objections already stated) under which of these three heads shall we arrange the various branches of pure mathematicks?

Are we therefore to conclude, that the magnificent design, conceived by Bacon, of enumerating, defining, and classifying the multifarious objects of human knowledge; (a design, on the successful accomplishment of which he himself believed that the advancement of the sciences essentially depended).—Are we to conclude, that this design was nothing more than the abortive offspring of a warm imagination, unsusceptible of any useful application to enlighten the mind, or to accelerate its progress? My own idea is widely different. The design was, in every respect, worthy of the sublime genius by which it was formed. Nor does it follow, because the execution was imperfect, that the attempt has been attended with no advantage. At the period when Bacon wrote, it was of much more consequence to exhibit to the learned a comprehensive sketch, than an accurate survey of the intellectual world;—such a sketch as, by pointing out to those whose views had been hitherto confined within the limits of particular regions, the relative posi-

tions and bearings of their respective districts, as parts of one great whole, might invite them all, for the common benefit, to a reciprocal exchange of their local riches. The societies or academies which, soon after, sprung up in different countries of Europe, for the avowed purpose of contributing to the general mass of information, by the collection of insulated facts, conjectures, and queries, afford sufficient proof, that the anticipations of Bacon were not, in this instance, altogether chimerical.

In examining the details of Bacon's survey, it is impossible not to be struck (more especially when we reflect on the state of learning two hundred years ago) with the minuteness of his information, as well as with the extent of his views ; or to forbear admiring his sagacity in pointing out, to future adventurers, the unknown tracks still left to be explored by human curiosity. If his classifications be sometimes artificial and arbitrary, they have at least the merit of including, under one head or another, every particular of importance ; and of exhibiting these particulars with a degree of method and of apparent connexion, which, if it does not always satisfy the judgment, never fails to interest the fancy, and to lay hold of the memory. Nor must it be forgotten, to the glory of his genius, that what he failed to accomplish remains to this day a desideratum in science,—that the intellectual chart delineated by him is, with all its imperfections, the only one of which modern philosophy has yet to boast ;—and that the united talents of D'Alembert and of Diderot, aided by all the lights of the eighteenth century, have been able to add but little to what Bacon performed.

After the foregoing observations, it will not be expected that an attempt is to be made, in the following Essay, to solve a problem which has so recently baffled the powers of these eminent writers ; and which will probably long continue to exercise the ingenuity of our successors. How

much remains to be previously done for the improvement of that part of Logick, whose province it is to fix the limits by which contiguous departments of study are defined and separated ! And how many unsuspected affinities may be reasonably presumed to exist among sciences, which, to our circumscribed views, appear at present the most alien from each other ! The abstract geometry of Apollonius and Archimedes was found, after an interval of two thousand years, to furnish a torch to the physical inquiries of Newton ; while, in the further progress of knowledge, the Etymology of Languages has been happily employed to fill up the chasms of Ancient History ; and the conclusions of Comparative Anatomy to illustrate the Theory of the Earth. For my own part, even if the task were executed with the most complete success, I should be strongly inclined to think, that its appropriate place in an Encyclopædia would be as a branch of the article on Logick ;—certainly *not* as an *exordium* to the Preliminary Discourse ; the enlarged and refined views, which it necessarily presupposes, being peculiarly unsuitable to that part of the work which may be expected, in the first instance, to attract the curiosity of every reader. As, upon this point, however, there may be some diversity of opinion, I have prevailed on the Editor to add to these introductory Essays a translation of D'Alembert's Discourse, and of Diderot's Prospectus. No English version of either has, as far as I know, been hitherto published ; and the result of their joint ingenuity, exerted on Bacon's groundwork, must for ever fix no inconsiderable era in the history of learning.

Before concluding this preface, I shall subjoin a few slight strictures on a very concise and comprehensive division of the objects of Human Knowledge, proposed by Mr. Locke, as the basis of a new classification of the sciences. Although I do not know that any attempt has ever been made

to follow out in detail the general idea, yet the repeated approbation which has been lately bestowed on a division essentially the same, by several writers of the highest rank, renders it in some measure necessary, on the present occasion, to consider how far it is founded on just principles; more especially as it is completely at variance, not only with the language and arrangement adopted in these preliminary essays, but with the whole of that plan on which the original projectors, as well as the continuators, of the *Encyclopædia Britannica*, appear to have proceeded. These strictures will, at the same time, afford an additional proof of the difficulty, or rather of the impossibility, in the actual state of logical science, of solving this great problem, in a manner calculated to unite the general suffrages of philosophers.

“All that can fall,” says Mr. Locke, “within the compass of Human Understanding being either, first, The nature of things as they are in themselves, their relations, and their manner of operation; or, secondly, That which man himself ought to do, as a rational and voluntary agent, for the attainment of any end, especially happiness; or, thirdly, The ways and means whereby the knowledge of both the one and the other of these is attained and communicated: I think science may be divided properly into these three sorts:

“1, *Φυσικη*, or Natural Philosophy. The end of this is bare speculative truth; and whatsoever can afford the mind of man any such, falls under this branch, whether it be God himself, angels, spirits, bodies, or any of their affections, as number and figure, &c.

“2, *Πρακτικη*, The skill of right applying our own powers and actions for the attainment of things good and useful. The most considerable under this head is *Ethicks*, which is the seeking out those rules and measures of human actions which lead to happiness, and the means to practise

them. The end of this is not bare speculation, but right, and a conduct suitable to it.¹

“3, *Σημειωτική*, or the doctrine of signs, the most usual whereof being words, it is aptly enough termed also *Λογική*, *Logick*. The business of this is, to consider the nature of signs the mind makes use of for the understanding of things, or conveying its knowledge to others.

“This seems to me,” continues Mr. Locke, “the first and most general, as well as natural, division of the objects of our understanding ; for a man can employ his thoughts about nothing but either the contemplation of *things* themselves, for the discovery of truth, or about the things in his own power, which are his own *actions*, for the attainment of his own ends ; or the *signs* the mind makes use of, both in one and the other, and the right ordering of them for its clearer information. All which three, viz. things as they are in themselves knowable ; actions as they depend on us, in order to happiness ; and the right use of *signs*, in order to knowledge ; being *toto cælo* different, they seemed to me to be the three great provinces of the intellectual world, wholly separate and distinct one from another.”²

From the manner in which Mr. Locke expresses himself in the above quotation, he appears evidently to have considered the division proposed in it as an original idea of his own ; and yet the truth is, that it coincides exactly with what was generally adopted by the philosophers of ancient Greece. “The ancient Greek Philosophy,” says

¹ From this definition it appears, that, as Locke included under the title of *Physicks*, not only *Natural Philosophy*, properly so called, but *Natural Theology*, and the *Philosophy of the Human Mind*, so he meant to refer to the head of *Practicks*, not only *Ethicks*, but all the various *Arts* of life, both mechanical and liberal.

² See the concluding chapter of the *Essay on Human Understanding*, entitled, “Of the Division of the Sciences.”

Mr. Smith, “was divided into three great branches, Physicks, or Natural Philosophy ; Ethicks, or Moral Philosophy ; and Logick. *This general division,*” he adds, “*seems perfectly agreeable to the nature of things.*” Mr. Smith afterwards observes, in strict conformity to Locke’s definitions, (of which, however, he seems to have had no recollection when he wrote this passage) “That, as the human mind and the Deity, in whatever their essence may be supposed to consist, are parts of the great system of the universe, and parts, too, productive of the most important effects, whatever was taught in the ancient schools of Greece concerning their nature, made a part of the system of physicks.”¹

Dr. Campbell, in his *Philosophy of Rhetorick*, has borrowed from the Grecian schools the same very extensive use of the words *physicks* and *physiology*, which he employs as synonymous terms ; comprehending under this title “not merely Natural History, Astronomy, Geography, Mechanicks, Opticks, Hydrostaticks, Meteorology, Medicine, Chemistry, but also Natural Theology and Psychology, which,” he observes, “have been, in his opinion, most unnaturally disjoined from Physiology by Philosophers.” “Spirit,” he adds, “which here comprises only the Supreme Being and the Human soul, is surely as much included under the notion of natural objects as body is ; and is knowable to the philosopher purely in the same way, by observation and experience.”²

A similar train of thinking led the late celebrated M. Turgot to comprehend under the name of Physicks, not only Natural Philosophy (as that phrase is understood by

¹ *Wealth of Nations*, Book v, chap. i.

² *Philosophy of Rhetorick*, Book i, chap. v, Part iii, § 1.

the Newtonians) but Metaphysicks, Logick, and even History. ¹

Notwithstanding all this weight of authority, it is difficult to reconcile one's self to an arrangement which, while it classes with Astronomy, with Mechanicks, with Opticks, and with Hydrostaticks, the strikingly contrasted studies of Natural Theology and of the Philosophy of the Human Mind, dis-unites from the two last the far more congenial sciences of Ethicks and of Logick. The human mind, it is true, as well as the material world which surrounds it, forms a part of the great system of the Universe ; but is it possible to conceive two parts of the same whole more completely dissimilar, or rather more diametrically opposite, in all their characteristic attributes ? Is not the one the appropriate field and province of *observation*,—a power habitually awake to all the perceptions and impressions of the bodily organs ? and does not the other fall exclusively under the cognizance of *reflection*,—an operation which inverts all the ordinary habits of the understanding,—abstracting the thoughts from every sensible object, and even striving to abstract them from every sensible image ? What abuse of language can be greater, than to apply a common name to departments of knowledge which invite the curiosity in di-

¹ “ Sous le nom de sciences physiques je comprends la logique, qui est la connoissance des operations de notre esprit et de la generation de nos idées, la metaphysique, qui s'occupe de la nature et de l'origine des êtres, et enfin la physique, proprement dite, qui observe l'action mutuel des corps les uns sur les autres, et les causes et l'enchainement des phénomènes sensibles. On pourroit y ajouter l'histoire.”—(*Oeuvres de Turgot*, Tome II, pp. 284, 285,

In the year 1795, a quarto volume was published at Bath, entitled *Intellectual Physicks*. It consists entirely of speculations concerning the human mind, and is by no means destitute of merit. The publication was anonymous ; but I have reason to believe that the author was the late well known Governour Pownall.

rections precisely contrary, and which tend to form intellectual talents, which, if not altogether incompatible, are certainly not often found united in the same individual? The word *Physicks*, in particular, which, in our language, long and constant use has restricted to the phenomena of Matter, cannot fail to strike every ear as *anomalously*, and therefore *illogically*, applied, when extended to those of Thought and of Consciousness.

Nor let it be imagined, that these observations assume any particular theory about the nature or essence of Mind. Whether we adopt, on this point, the language of the Materialists, or that of their opponents, it is a proposition equally certain and equally indisputable, that the phenomena of Mind and those of Matter, as far as they come under the cognizance of our faculties, appear to be more completely heterogeneous, than any other classes of facts within the circle of our knowledge; and that the sources of our information concerning them are in every respect so radically different, that nothing is more carefully to be avoided, in the study of either, than an attempt to assimilate them, by means of analogical or metaphorical terms, applied to both in common. In those inquiries, above all, where we have occasion to consider Matter and Mind as conspiring to produce the same joint effects (in the constitution, for example, of our own compounded frame,) it becomes more peculiarly necessary to keep constantly in view the distinct province of each, and to remember, that the business of philosophy is not to resolve the phenomena of the one into those of the other, but merely to ascertain the general laws which regulate their mutual connexion. *Matter* and *Mind*, therefore, it should seem, are the two most general heads which ought to form the groundwork of an Encyclopedical classification of the sciences and arts. No branch of human knowledge, no work of human skill, can be men-

tioned, which does not obviously fall under the former head or the latter.

Agreeably to this twofold classification of the sciences and arts, it is proposed, in the following introductory Essays, to exhibit a rapid sketch of the progress made since the revival of letters: *First*, in those branches of knowledge which relate to Mind; and, *secondly*, in those which relate to Matter. D'Alembert, in his Preliminary Discourse, has boldly attempted to embrace both subjects in one magnificent design; and never, certainly, was there a single mind more equal to such an undertaking. The historical outline which he has there traced, forms by far the most valuable portion of that performance, and will for ever remain a proud monument to the depth, to the comprehensiveness, and to the singular versatility of his genius. In the present state of science, however, it has been apprehended, that, by dividing so great a work among different hands, something might perhaps be gained, if not in point of reputation to the authors, at least in point of instruction to their readers. This division of labour was, indeed, in some measure, rendered necessary (independently of all other considerations) by the important accessions which mathematicks and physicks have received since D'Alembert's time;—by the innumerable improvements which the spirit of mercantile speculation, and the rivalship of commercial nations, have introduced into the mechanical arts;—and, above all, by the rapid succession of chemical discoveries which commences with the researches of Black and of Lavoisier. The part of this task which has fallen to my share is certainly, upon the whole, the least splendid in the results which it has to record; but I am not without hopes, that this disadvantage may be partly compensated by its closer connexion with (what ought to be the ultimate end of all our pursuits) the intellectual and moral improvement of the species.

I am, at the same time, well aware that, in proportion as this last consideration increases the importance, it adds to the difficulty of my undertaking. It is chiefly in judging of questions “coming home to their business and bosoms,” that casual associations lead mankind astray; and of such associations how incalculable is the number arising from false systems of religion, oppressive forms of government, and absurd plans of education! The consequence is, that while the physical and mathematical discoveries of former ages present themselves to the hand of the historian, like masses of pure and native gold, the truths which we are here in quest of may be compared to *iron*, which, although at once the most necessary and the most widely diffused of all the metals, commonly requires a discriminating eye to detect its existence, and a tedious, as well as nice process, to extract it from the ore.

To the same circumstance it is owing, that improvements in Moral and in Political Science do not strike the imagination with nearly so great force as the discoveries of the Mathematician or of the Chemist. When an inveterate prejudice is destroyed by extirpating the casual associations on which it was grafted, how powerful is the new impulse given to the intellectual faculties of man! Yet how slow and silent the process by which the effect is accomplished! Were it not, indeed, for a certain class of learned authors, who, from time to time, heave the log into the deep, we should hardly believe that the reason of the species is progressive. In this respect, the religious and academical establishments in some parts of Europe are not without their use to the historian of the Human Mind. Immoveably moored to the same station by the strength of their cables, and the weight of their anchors, they enable him to measure the rapidity of the current by which the rest of the world are born along.

This, too, is remarkable in the history of our prejudices ; that, as soon as the film falls from the intellectual eye, we are apt to lose all recollection of our former blindness. Like the fantastick and giant shapes which, in a thick fog, the imagination lends to a block of stone, or to the stump of a tree, they produce, while the illusion lasts, the same effect with truths and realities ; but the moment the eye has caught the exact form and dimensions of its object, the spell is broken for ever ; nor can any effort of thought again conjure up the spectres which have vanished.

As to the subdivisions of which the sciences of Matter and of Mind are susceptible, I have already said, that this is not the proper place for entering into any discussion concerning them. The passages above quoted from D'Alembert, from Locke, and from Smith, are sufficient to shew how little probability there is, in the actual state of Logical Science, of uniting the opinions of the learned, in favour of any one scheme of partition. To prefix, therefore, such a scheme to a work which is professedly to be carried on by a set of unconnected writers, would be equally presumptuous and useless ; and, on the most favourable supposition, could tend only to fetter, by means of dubious definitions, the subsequent freedom of thought and of expression. The example of the French *Encyclopédie* cannot be here justly alleged as a precedent. The preliminary pages by which it is introduced were written by the two persons who projected the whole plan, and who considered themselves as responsible, not only for their own admirable articles, but for the general conduct of the execution ; whereas, on the present occasion, a porch was to be adapted to an irregular edifice, reared, at different periods, by different architects. It seemed, accordingly, most advisable, to avoid, as much as possible, in these introductory Essays, all innovations in language, and, in describing the different arts and sciences,

to follow scrupulously the prevailing and most intelligible phraseology. The task of defining them, with a greater degree of precision, properly devolves upon those to whose province it belongs, in the progress of the work, to unfold in detail their elementary principles.

The sciences to which I mean to confine my observations are Metaphysics, Ethics, and Political Philosophy; understanding, by Metaphysics, not the Ontology and Pneumatology of the schools, but the inductive Philosophy of the Human Mind; and limiting the phrase, Political Philosophy, almost exclusively to the modern science of Political Economy; or (to express myself in terms at once more comprehensive and more precise) to that branch of the theory of legislation which, according to Bacon's definition, aims to ascertain those "*Leges legum, ex quibus informatio peti potest quid in singulis legibus bene aut perperam positum aut constitutum sit.*" The close affinity between these three departments of knowledge, and the easy transitions by which the curiosity is invited from the study of any one of them to that of the other two, will sufficiently appear from the following Historical Review.

DISSERTATION FIRST.

PART I.

IN the following Historical and Critical Sketches, it has been judged proper by the different writers, to confine their views entirely to the period which has elapsed since the *revival of letters*. To have extended their retrospects to the ancient world would have crowded too great a multiplicity of objects into the limited canvass on which they had to work. For my own part, I might perhaps, with still greater propriety, have confined myself exclusively to the two last centuries; as the Sciences, of which I am to treat, present but little matter for useful remark, prior to the time of Lord Bacon. I shall make no apology, however, for devoting, in the first place, a few pages to some observations of a more general nature; and to some scanty gleanings of literary detail, bearing more or less directly on my principal design.

On this occasion, as well as in the sequel of my Discourse, I shall avoid, as far as is consistent with distinctness and perspicuity, the minuteness of the mere bibliographer; and, instead of attempting to amuse my readers with a series of critical epigrams, or to dazzle them with a rapid succession of evanescent portraits, shall study to fix their attention on those great *lights of the world* by whom the

torch of science has been successively seized and transmitted.¹ It is, in fact, such leading characters alone which furnish matter for philosophical history. To enumerate the names and the labours of obscure or even secondary authors (whatever amusement it might afford to men of curious erudition) would contribute but little to illustrate the origin and filiation of consecutive systems, or the gradual development and progress of the human mind.

¹ I have ventured here to combine a scriptural expression with an allusion of Plato's to a Grecian game; an allusion which, in his writings, is finely and pathetically applied to the rapid succession of generations, through which the continuity of human life is maintained from age to age; and which are perpetually transferring from hand to hand the concerns and duties of this fleeting scene. Γεννωντες και εκτρεφοντες παιδας, καθαπερ λαμπαδα τον βιον παραδιδοντες αλλοις εξ αλλων. (Plato, *Leg.* lib. vi.)

Et quasi cursores vitæ lampada tradunt. — Lucret.

CHAPTER I.

FROM THE REVIVAL OF LETTERS TO THE PUBLICATION OF BACON'S
PHILOSOPHICAL WORKS.

THE long interval, commonly known by the name of the *middle ages*, which immediately preceded the revival of letters in the western part of Europe, forms the most melancholy blank which occurs, from the first dawn of recorded civilization, in the intellectual and moral history of the human race. In one point of view alone, the recollection of it is not altogether unpleasing, in as much as, by the proof it exhibits of the inseparable connexion between ignorance and prejudice on the one hand, and vice, misery, and slavery, on the other, it affords, in conjunction with other causes, which will afterwards fall under our review, some security against any future recurrence of a similar calamity.

It would furnish a very interesting and instructive subject of speculation, to record and to illustrate (with the spirit, however, rather of a philosopher than of an antiquary) the various abortive efforts, which, during this protracted and seemingly hopeless period of a thousand years, were made by enlightened individuals, to impart to their contemporaries the fruits of their own acquirements. For in no one age from its commencement to its close, does *the continuity of knowledge* (if I may borrow an expression of Mr Harris) seem to have been entirely interrupted: "There was always a faint twilight, like that auspicious gleam which, in a summer's night, fills up the interval be-

tween the setting and the rising sun.”¹ On the present occasion, I shall content myself with remarking the important effects produced by the numerous monastick establishments all over the Christian world, in preserving, amidst the general wreck, the inestimable remains of Greek and Roman refinement; and in keeping alive, during so many centuries, those scattered sparks of truth and of science, which were afterwards to kindle into so bright a flame. I mention this particularly, because, in our zeal against the vices and corruptions of the Romish church, we are too apt to forget, how deeply we are indebted to its superstitious and apparently useless foundations, for the most precious advantages that we now enjoy.

The study of the Roman Law, which, from a variety of causes, natural as well as accidental, became, in the course of the twelfth century, an object of general pursuit, shot a strong and auspicious ray of intellectual light across the surrounding darkness. No study could then have been presented to the curiosity of men, more happily adapted to improve their taste, to enlarge their views, or to invigorate their reasoning powers; and although, in the first instance, prosecuted merely as the object of a weak and undistinguishing idolatry, it nevertheless conducted the student to the very confines of ethical as well as of political speculation; and served, in the meantime, as a substitute of no inconsiderable value for both these sciences. Accordingly we find that, while in its *immediate* effects it powerfully contributed, wherever it struck its roots, by ameliorating and systematizing the administration of justice, to accelerate the progress of order and of civilization, it afterwards furnished, in the farther career of human advancement, the parent stock on which were grafted the first rudiments of

¹ *Philological Inquiries*, Part III, chap. i.

pure ethicks and of liberal politicks taught in modern times. I need scarcely add, that I allude to the systems of *natural jurisprudence* compiled by Grotius and his successors; systems which, for a hundred and fifty years, engrossed all the learned industry of the most enlightened part of Europe; and which, however unpromising in their first aspect, were destined, in the last result, to prepare the way for that never to be forgotten change in the literary taste of the eighteenth century, “which has every where turned the spirit of philosophical inquiry from frivolous or abstruse speculations, to the business and affairs of men.”¹

The revival of letters may be considered as coëval with the fall of the Eastern empire, towards the close of the fifteenth century. In consequence of this event, a number of learned Greeks took refuge in Italy, where the taste for literature already introduced by Dante, Petrarch, and Boccaccio, together with the liberal patronage of the illustrious House of Medicis, secured them a welcome reception. A knowledge of the Greek tongue soon became fashionable; and the learned, encouraged by the rapid diffusion which the art of printing now gave to their labours, vied with each other in rendering the Greek authors accessible, by means of Latin translations, to a still wider circle of readers.

For a long time, indeed, after the era just mentioned, the progress of useful knowledge was extremely slow. The passion for logical disputation was succeeded by an unbounded admiration for the wisdom of antiquity; and in proportion as the pedantry of the schools disappeared in the universities, that of erudition and philology occupied its place.

¹ Dr. Robertson, from whom I quote these words, has mentioned this change as the glory of the *present age*, meaning, I presume, the period which has elapsed since the time of Montesquieu. By what steps the philosophy to which he alludes took its rise from the systems of jurisprudence previously in fashion, will appear in the sequel of this Discourse.

Meanwhile, an important advantage was gained in the immense stock of materials which the ancient authors supplied to the reflections of speculative men; and which, although frequently accumulated with little discrimination or profit, were much more favourable to the development of taste and of genius, than the unsubstantial subtilities of ontology or of dialecticks. By such studies were formed Erasmus,¹ Ludovicus Vives,² Sir Thomas

¹ The writings of Erasmus probably contributed still more than those of Luther himself to the progress of the Reformation among men of education and taste; but, without the cooperation of bolder and more decided characters than his, little would to this day have been effected in Europe among the lower orders. "Erasmus imagined," as is observed by his biographer, "that at length, by training up youth in learning and useful knowledge, those religious improvements would gradually be brought about, which the Princes, the Prelates, and the Divines of his days could not be persuaded to admit or to tolerate." (Jortin, p. 279.) In yielding, however, to this pleasing expectation, Erasmus must have flattered himself with the hope, not only of a perfect freedom of literary discussion, but of such reforms in the prevailing modes of instruction, as would give complete scope to the energies of the human mind;—for, where books and teachers are subjected to the censorship of those who are hostile to the dissemination of truth, they become the most powerful of all auxiliaries to the authority of established errors.

It was long a proverbial saying among the ecclesiasticks of the Romish church, that "Erasmus laid the egg, and Luther hatched it;" and there is more truth in the remark, than in most of their sarcasms on the same subject.

² Ludovicus Vives was a learned Spaniard, intimately connected both with Erasmus and More; with the former of whom he lived for some time at Louvain; "where they both promoted literature as much as they could, though not without great opposition from some of the divines." Jortin, p. 255.

"He was invited into England by Wolsey, in 1523; and coming to Oxford, he read the Cardinal's lecture of *Humanity*, and also lectures of Civil Law, which Henry VIII, and his Queen, Catharine, did him the honour of attending." (Ibid. p. 207.) He died at Bruges in 1554.

In point of good sense and acuteness, wherever he treats of philosophical questions, he yields to none of his contemporaries;

More,¹ and many other accomplished scholars of a similar character, who, if they do not rank in the same line with the daring reformers by whom the errors of the Catholick church were openly assailed, certainly exhibit a very striking contrast to the barbarous and unenlightened writers of the preceding age.

The Protestant Reformation, which followed immediately after, was itself one of the natural consequences of the revival of letters, and of the invention of printing. But although, in one point of view, only an *effect*, it is not, on the present occasion, less entitled to notice than the *causes* by which it was produced.

The renunciation, in a great part of Europe, of theological opinions so long consecrated by time, and the adoption of a creed more pure in its principles and more liberal in its spirit, could not fail to encourage, on all other subjects, a congenial freedom of inquiry. These circumstances operated still more directly and powerfully, by their influence in undermining the authority of Aristotle; an authority, which for many years was scarcely inferior in the schools to that of the scriptures; and which, in some Universities, was supported by statutes, requiring the teachers to promise upon oath, that, in their publick lectures, they would follow no other guide.

and in some of his anticipations of the future progress of science, he discovers a mind more comprehensive and sagacious than any of them. Erasmus appears, from a letter of his to Budæus (dated in 1521,) to have foreseen the brilliant career which Vives, then a very young man, was about to run. “Vives in stadio literario, non minus feliciter quam gnaviter decertat, et si satis ingenium hominis novi, non conquiescet, donec omnes a tergo reliquerit.”—For this letter (the whole of which is peculiarly interesting, as it contains a character of Sir Thomas More, and an account of the extraordinary accomplishments of his daughters,) see Jortin’s *Life of Erasmus*, vol. II, p. 366, *et seq.*

¹ See Note A.

Luther,¹ who was perfectly aware of the corruptions which the Romish church had contrived to connect with their veneration for the Stagirite,² not only threw off the yoke himself, but, in various parts of his writings, speaks of Aristotle with most unbecoming asperity and contempt.³ In one very remarkable passage, he asserts, that the study of Aristotle was wholly useless, not only in Theology, but in Natural Philosophy. “What does it contribute,” he asks, “to the knowledge of things, to trifle and cavil in language conceived and prescribed by Aristotle, concerning matter, form, motion, and time?”⁴ The same free-

¹ Born 1483, died 1546.

² In one of his letters he writes thus: “Ego simpliciter credo, quod impossibile sit ecclesiam reformari, nisi funditus canones, decretales, scholastica theologia, philosophia, logica, ut nunc habentur, eradicentur, et alia instituantur.” Bruckeri *Hist. Crit. Phil.* Tom. IV, p. 95.

³ For a specimen of Luther’s scurrility against Aristotle, see Bayle, Art. *Luther*, Note HH.

In Luther’s *Colloquia Mensalia* we are told, that “he abhorred the Schoolmen, and called them sophistical locusts, caterpillars, frogs, and lice.” From the same work we learn, that “he hated Aristotle, but highly esteemed Cicero, as a wise and good man.” See Jortin’s *Life of Erasmus*, p. 121.

⁴ “Nihil adjumenti ex ipso haberi posse non solum ad theologiam seu sacras literas, verum etiam ad ipsam naturalem philosophiam. Quid enim juvet ad rerum cognitionem, si de materia, forma, motu, tempore, nugari et cavillari queas verbis ab Aristotele conceptis et praescriptis?” Bruck. *Hist. Phil.* Tom. IV, p. 101.

The following passage to the same purpose is quoted by Bayle: “Non mihi persuadebitis, philosophiam esse garrulitatem illam de materia, motu, infinito, loco, vacuo, tempore, quae ferè in Aristotele sola discimus, talia quae nec intellectum, nec affectum, nec communes hominum mores quidquàm juvent; tantum contentionibus serendis, seminandisque idonea.” Bayle, Art. *Luther*, Note HH.

I borrow from Bayle another short extract from Luther: “Nihil ita ardet animus, quàm histrionem illum, (Aristotelem,) qui tam verè Graeca larva ecclesiam lusit, multis revelare, ignomi-

dom of thought on topicks not strictly theological, formed a prominent feature in the character of Calvin. A curious instance of it occurs in one of his letters, where he discusses an ethical question of no small moment in the science of political economy ;—"How far it is consistent with morality to accept of interest for a pecuniary loan?" On this question, which, even in Protestant countries, continued, till a very recent period, to divide the opinions both of divines and lawyers, Calvin treats the authority of Aristotle and that of the church with equal disregard. To the former, he opposes a close and logical argument, not unworthy of Mr. Bentham. To the latter he replies, by shewing, that the Mosaick law on this point was not a moral but a municipal prohibition ; a prohibition not to be judged of from any particular text of Scripture, but upon the principles of natural equity.¹ The example of these two Fathers of the Reformation, would probably have been followed by consequences still greater and more immediate, if Melanchthon had not unfortunately given the sanction of his name to the doctrines of the Peripatetick school :² but

niamque ejus cunctis ostendere, si otium esset. Habeo in manus commentariolos in 1, Physicorum, quibus fabulam Aristaei denudò agere statui in meum istum Protea (Aristotelem.) Pars crucis meae vel maxima est, quod videre cogor fratrum optima ingenia, bonis studiis nata, in istis coenis vitam agere, et operam perdere." Ibid.

That Luther was deeply skilled in the scholastick philosophy we learn from very high authority, that of Melanchthon ; who tells us farther, that he was a strenuous partizan of the sect of *Nominalists*, or, as they were then generally called, *Terminists*. Bruck. Tom. IV, pp. 93, 94, *et seq.*

¹ See Note B.

² "Et Melanchthoni quidem praecipue debetur conservatio philosophiae Aristotelicae in academiis protestantium. Scripsit is compendia plerarumque disciplinarum philosophiae Aristotelicae, quae in Academiis diu regnarunt." Heineccii, *Elem. Hist. Phil.* § ciii. See also *Bayle's Dictionary*, Art. *Melanchthon*.

still, among the Reformers in general, the credit of these doctrines gradually declined, and a spirit of research and of improvement prevailed.

The invention of printing, which took place very nearly at the same time with the fall of the Eastern Empire, besides adding greatly to the efficacy of the causes above mentioned, must have been attended with very important effects of its own, on the progress of the human mind. For us, who have been accustomed, from our infancy, to the use of books, it is not easy to form an adequate idea of the disadvantages which those laboured under, who had to acquire the whole of their knowledge through the medium of universities and schools;—blindly devoted as the generality of students must then have been to the peculiar opinions of the teacher, who first unfolded to their curiosity the treasures of literature and the wonders of science. Thus error was perpetuated; and, instead of yielding to time, acquired additional influence in each successive generation.¹ In modern times, this influence of names is, com-

¹ It was in consequence of this mode of conducting education by means of oral instruction alone, that the different sects of philosophy arose in ancient Greece; and it seems to have been with a view of counteracting the obvious inconveniences resulting from them, that Socrates introduced his peculiar method of questioning, with an air of skeptical diffidence, those whom he was anxious to instruct; so as to allow them, in forming their conclusions, the complete and unbiassed exercise of their own reason. Such, at least, is the apology offered for the apparent indecision of the Academick school, by one of its wisest, as well as most eloquent adherents. “As for other sects,” says, Cicero, “who are bound in fetters, before they are able to form any judgment of what is right or true, and who have been led to yield themselves up, in their tender years, to the guidance of some friend, or to the captivating eloquence of the teacher whom they have first heard, they assume to themselves the right of pronouncing upon questions of which they are completely ignorant; adhering to whatever creed the wind of doctrine may have driven them, as if it were the only rock on which their safety depended.” *Cic. Lucullus*, 3.

paratively speaking, at an end. The object of a publick teacher is no longer to inculcate a particular system of dogmas, but to prepare his pupils for exercising their own judgments; to exhibit to them an outline of the different sciences, and to suggest subjects for their future examination. The few attempts to establish schools and to found sects, have all (after perhaps a temporary success) proved abortive. Their effect, too, during their short continuance, has been perfectly the reverse of that of the schools of antiquity; for whereas these are instrumental, on many occasions, in establishing and diffusing error in the world, the founders of our modern sects, by mixing up important truths with their own peculiar tenets, and by disguising them under the garb of a technical phraseology, have fostered such prejudices against themselves, as have blinded the publick mind to all the lights they were able to communicate. Of this remark a melancholy illustration occurs (as M. Turgot long ago predicted) in the case of the French Economists; and many examples of a similar import might be produced from the history of science in our country; more particularly from the history of the various medical and metaphysical schools which successively rose and fell during the last century.

With the circumstances already suggested, as conspiring to accelerate the progress of knowledge, another has co-operated very extensively and powerfully; the rise of the lower orders in the different countries of Europe,—in consequence partly of the enlargement of commerce, and partly of the efforts of the Sovereigns to reduce the overgrown power of the feudal aristocracy.

Without this emancipation of the lower orders, and the gradual diffusion of wealth by which it was accompanied, the advantages derived from the invention of printing would have been extremely limited. A certain degree of ease

and independence is essentially requisite to inspire men with the desire of knowledge, and to afford the leisure necessary for acquiring it; and it is only by the encouragement which such a state of society presents to industry and ambition, that the selfish passions of the multitude can be interested in the intellectual improvement of their children. It is only, too, in such a state of society, that education and books are likely to increase the sum of human happiness; for while these advantages are confined to one privileged description of individuals, they but furnish them with an additional engine for debasing and misleading the minds of their inferiours. To all which it may be added, that it is chiefly by the shock and collision of different and opposite prejudices, that truths are gradually cleared from that admixture of error which they have so strong a tendency to acquire, wherever the course of publick opinion is forcibly constrained and guided within certain artificial channels, marked out by the narrow views of human policy. The diffusion of knowledge, therefore, occasioned by the rise of the lower orders, would necessarily contribute to the improvement of useful science, not merely in proportion to the arithmetical number of cultivated minds now combined in the pursuit of truth, but in a proportion tending to accelerate that important effect with a far greater rapidity.

Nor ought we here to overlook the influence of the foregoing causes, in encouraging among authors the practice of addressing the multitude in their own vernacular tongues. The zeal of the Reformers first gave birth to this invaluable innovation; and imposed on their adversaries the necessity of employing, in their own defence, the same weapons.¹

¹ “The sacred books were, in almost all the kingdoms and states of Europe, translated into the language of each respective people, particularly in Germany, Italy, France, and Britain.” (Mosheim’s *Eccles. Hist.* vol. III, p. 265.) The effect of this

From that moment the prejudice began to vanish which had so long confounded knowledge with erudition; and a revolution commenced in the republick of letters, analogous to what the invention of gunpowder produced in the art of war. “All the splendid distinctions of mankind,” as the Champion and Flower of Chivalry indignantly exclaimed, “were thereby thrown down; and the naked shepherd levelled with the knight clad in steel.”

To all these considerations may be added the gradual effects of time and experience in correcting the errors and prejudices which had misled philosophers during so long a succession of ages. To this cause, chiefly, must be ascribed the ardour with which we find various ingenious men, soon after the period in question, employed in prosecuting *experimental* inquiries; a species of study to which nothing analogous occurs in the history of ancient science.¹ The boldest and most successful of this new school was the celebrated Paracelsus; born in 1493, and consequently only ten years younger than Luther. “It is impossible to doubt,” says Le Clerc, in his *History of Physick*, “that he possessed an extensive knowledge of what is called the *Materia Medica*, and that he had employed much time in working on the animal, the vegetable, and the mineral substances of which it is composed. He seems, besides, to have tried an immense number of experiments in chemistry; but he has this great defect, that he studiously conceals or disguises the results of his long experience.” The

single circumstance in multiplying the number of readers and of thinkers, and in giving a certain stability to the mutable forms of oral speech, may be easily imagined. The vulgar translation of the Bible into English, is pronounced by Dr. Lowth to be still the best standard of our language.

¹ “Haec nostra (ut saepe diximus) felicitatis cujusdam sunt potius quam facultatis, *et potius temporis partus quam ingenii.*” *Nov. Org.* Lib. i, c. xxiii.

same author quotes from Paracelsus a remarkable expression, in which he calls the philosophy of Aristotle *a wooden foundation*. “He ought to have attempted,” continues Le Clerc, “to have laid a better; but if he has not done it, he has at least, by discovering its weakness, invited his successors to look out for a firmer basis.”¹

Lord Bacon himself, while he censures the moral frailties of Paracelsus, and the blind empiricism of his followers, indirectly acknowledges the extent of his experimental information: “The ancient sophists may be said to have hid; but Paracelsus extinguished the light of nature. The sophists were only deserters of experience, but Paracelsus has betrayed it. At the same time, he is so far from understanding the right method of conducting experiments, or of recording their results, that he has added to the trouble and tediousness of experimenting. By wandering through the wilds of experience, his disciples sometimes stumble upon useful discoveries, not by reason, but by accident;—whence rashly proceeding to form theories, they carry the smoke and tarnish of their art along with them; and, like childish operators at the furnace, attempt to raise a structure of philosophy with a few experiments of distillation.”

Two other circumstances, of a nature widely different from those hitherto enumerated, although, probably, in no small degree to be accounted for on the same principles, seconded, with an incalculable accession of power, the sudden impulse which the human mind had just received. The same century which the invention of printing, and the revival of letters have made for ever memorable, was also illustrated by the discovery of the New World, and of the passage to India by the Cape of Good Hope;—events which may be justly regarded as fixing a new era in the

¹ Histoire de la Médecine, (à la Haye, 1729,) p. 819.

political and moral history of mankind ; and which still continue to exert a growing influence over the general condition of our species. “ It is an era” as Raynal observes, “ which gave rise to a revolution, not only in the commerce of nations, but in the manners, industry, and government of the world. At this period new connexions were formed by the inhabitants of the most distant regions, for the supply of wants which they had never before experienced. The productions of climates situated under the equator, were consumed in countries bordering on the pole ; the industry of the north was transplanted to the south ; and the inhabitants of the west were clothed with the manufactures of the east ; a general intercourse of opinions, laws and customs, diseases and remedies, virtues and vices, was established among men.”

“ Every thing,” continues the same writer, “ has changed, and must yet change more. But it is a question, whether the revolutions that are past, or those which must hereafter take place, have been, or can be, of any utility to the human race. Will they add to the tranquillity, to the enjoyments, and to the happiness of mankind ? Can they improve our present state, or do they only change it ?”

I have introduced this quotation, not with the design of attempting at present any reply to the very interesting question with which it concludes ; but merely to convey some slight notion of the political and moral importance of the events in question. I cannot, however, forbear to remark, in addition to Raynal’s eloquent and impressive summary, the inestimable treasure of new facts which these events have furnished for illustrating the versatile nature of man, and the history of civil society. In this respect (as Bacon has well observed) they have fully verified the Scripture prophecy, *multi pertransibunt et augebitur scientia* ; or, in the still more emphatical words of our English

version, "Many shall go to and fro, and knowledge shall be increased."¹ The same prediction may be applied to the gradual renewal (in proportion as modern governments became effectual in securing order and tranquillity) of that intercourse between the different states of Europe, which had, in a great measure, ceased during the anarchy and turbulence of the middle ages.

In consequence of these combined causes, aided by some others of secondary importance,² the Genius of the human

¹ "Neque omittenda est prophetia Danielis de ultimis mundi temporibus; *multi pertransibunt et augebitur scientia*: Manifeste innuens et significans, esse in fatis, id est, in providentia, ut pertransitus mundi (qui per tot longinquas navigationes impletur plane, aut jam in opere esse videtur) et augmenta scientiarum in eandem aetatem incidant." *Nov. Org. Lib. xciii.*

² Such as the *accidental* inventions of the telescope and of the microscope. The powerful influence of these inventions may be easily conceived; not only in advancing the sciences of Astronomy and of Natural History, but in banishing many of the scholastick prejudices then universally prevalent. The effects of the telescope, in this respect, have been often remarked; but less attention has been given to those of the microscope,—which however, it is probable, contributed not a little to prepare the way for the modern revival of the Atomick or Corpuscular Philosophy, by Bacon, Gassendi, and Newton. That, on the mind of Bacon, the wonders disclosed by the microscope produced a strong impression in favour of the Epicurean physicks, may be inferred from his own words. "*Perspicillum (microscopicum) si vidisset Democritus, exsiluisset forte; et modum videndi Atomum (quem ille invisibilem omnino affirmavit) inventum fuisse putasset.*" *Nov. Org. Lib. ii, § 39.*

We are told in the life of Galileo, that when the telescope was invented, some individuals carried to so great a length their devotion to Aristotle, that they positively refused to look through that instrument: so averse were they to open their eyes to any truths inconsistent with their favourite creed. "*Vita del Galileo, Venezia, 1744.*" It is amusing to find some other followers of the Stagirite, a very few years afterwards, when they found it impossible any longer to call in question the evidence of sense, asserting that it was from a passage in Aristotle, where he attempts to explain why stars become visible in the daytime when

race seems, all at once, to have awakened with renovated and giant strength, from his long sleep. In less than a century from the invention of printing, and the fall of the Eastern empire, Copernicus discovered the true theory of the planetary motions, and a very few years afterwards, was succeeded by the three great precursors of Newton,—Tycho Brahe, Kepler, and Galileo.

The step made by Copernicus may be justly regarded as one of the proudest triumphs of human reason ;—whether we consider the sagacity which enabled the author to obviate, to his own satisfaction, the many plausible objections which must have presented themselves against his conclusions, at a period when the theory of motion was so imperfectly understood ; or the bold spirit of inquiry which encouraged him to exercise his private judgment, in opposition to the authority of Aristotle,—to the decrees of the church of Rome,—and to the universal belief of the learned, during a long succession of ages. He appears, indeed, to

viewed from the bottom of a deep well) that the invention of the telescope was borrowed. The two facts, when combined together, exhibit a truly characteristic portrait of one of the most fatal weaknesses incident to humanity ; and form a moral apologue, daily exemplified on subjects of still nearer and higher interest than the phenomena of the heavens.

In ascribing to *accident* the inventions of the telescope and of the microscope, I have expressed myself in conformity to common language ; but it ought not to be overlooked, that an invention may be accidental with respect to the particular author, and yet may be the natural result of the circumstances of society at the period when it took place. As to the instruments in question, the combination of lenses employed in their structure is so simple, that it could scarcely escape the notice of *all* the experimenters and mechanics of that busy and inquisitive age. A similar remark has been made by Condorcet concerning the invention of printing. “ L’invention de l’Imprimerie a sans doute avancé le progrès de l’espèce humaine ; mais cette invention étoit elle-même une suite de l’usage de la lecture répandu dans un grand nombre de pays.” *Vie du Turgot.*

have well merited the encomium bestowed on him by Kepler, when he calls him “ a man of vast genius, and, what is of still greater moment in these researches, a man of a free mind.”

The establishment of the Copernican system, beside the new field of study which it opened to Astronomers, must have had great effects on philosophy in all its branches, by inspiring those sanguine prospects of future improvement, which stimulate curiosity, and invigorate the inventive powers. It afforded to the common sense, even of the illiterate, a palpable and incontrovertible proof, that the ancients had not exhausted the stock of possible discoveries; and that, in matters of science, the creed of the Romish church was not infallible. In the conclusion of one of Kepler's works, we perceive the influence of these prospects on his mind. “ Haec et cetera hujusmodi latent in pandectis aevi sequentis, non antea discenda, quam librum hunc Deus arbiter seculorum recluserit mortalibus.”¹

I have hitherto taken no notice of the effects of the revival of letters on Metaphysical, Moral, or Political science. The truth is, that little deserving of our attention occurs in any of these departments prior to the seventeenth century; and nothing which bears the most remote analogy to the rapid strides made, during the sixteenth, in mathematics, astronomy, and physicks. The influence, indeed, of the reformation on the *practical* doctrines of ethicks appears to have been great and immediate. We may judge of this from a passage in Melanchthon, where he combats the pernicious and impious tenets of those theologians who maintained, that moral distinctions are created entirely by the arbitrary and revealed will of God. In opposition to this heresy he expresses himself in these memorable words:—

¹ *Epit. Astron. Copernic.*

“ Wherefore our decision is this ; that those precepts which learned men have committed to writing, transcribing them from the common reason and common feelings of human nature, are to be accounted as not less divine, than those contained in the tables given to Moses ; and that it could not be the intention of our Maker to supersede, by a law graven upon stone, that which is written with his own finger on the table of the heart.” ¹—This language was, undoubtedly, a most important step towards a just system of Moral Philosophy ; but still, like the other steps of the Reformers, it was only a return to common sense, and to the genuine spirit of Christianity, from the dogmas imposed on the credulity of mankind by an ambitious priesthood. ² Many

¹ Proinde sic statuimus, nihilo minus divina præcepta esse ea, quæ a sensu communi et naturæ judicio mutuati docti homines gentiles literis mandarunt, quam quæ extant in ipsis saxeis Mo-
sis tabulis. Neque ille ipse cælestis Pater pluris a nobis fieri eas leges voluit, quas in saxo scripsit, quam quas in ipsos animorum nostrorum sensus impresserat.”

Not having it in my power at present to consult Melanchthon's works, I have transcribed the foregoing paragraph on the authority of a learned German Professor, Christ. Meiners. See his *Historia Doctrinæ de Vero Deo*. Lemgovix, 1780, p. 12.

² It is observed by Dr. Cudworth, that the doctrine which refers the origin of moral distinctions to the arbitrary appointment of the Deity, was strongly reprobated by the ancient fathers of the Christian church, and that “ it crept up afterward in the scholastick ages ; Occam being among the first that maintained, that there is no act evil, but as it is prohibited by God, and which cannot be made good, if it be commanded by him. In this doctrine he was quickly followed by Petrus Alliacus, Andreas de Novo Castro, and others.” See *Treatise of Immutable Morality*.

It is pleasing to remark, how very generally the heresy here ascribed to Occam is now reprobated by good men of all persuasions. The Catholicks have even begun to recriminate on the Reformers as the first broachers of it ; and it is to be regretted, that in *some* of the writings of the latter, too near approaches to it are to be found. The truth is (as Burnet long ago observed,) that the effects of the reformation have not been confined to the reformed churches ;—to which it may be added, that

years were yet to elapse, before any attempts were to be made to trace, with analytical accuracy, the moral phenomena of human life to their first principles in the constitution and condition of man; or even to disentangle the plain and practical lessons of ethicks from the speculative and controverted articles of theological systems. ¹

both Catholics and Protestants have, since that era, profited very largely by the general progress of the sciences and of human reason.

I quote the following sentence from a highly respectable Catholic writer on the law of nature and nations:—"Qui rationem exulare jubent a moralibus præceptis quæ in sacris literis traduntur, et in absurdam enormemque LUTHERI sententiam imprudentes incidunt (quam egregie et elegantissime refutavit Melchior Canus *Loc. Theolog.* Lib. ix, and x) et ea docent, quæ si sectatores inveniant moralia omnia susque deque miscere, et revelationem ipsam inutilem omnino et inefficacem reddere possent." (Lampredi Florentini *Juris Naturæ et Gentium Theoremata*, Tom. II, p. 195. Pisis, 1782.) For the continuation of the passage, which would do credit to the most liberal protestant, I must refer to the original work. The zeal of Luther for the doctrine of the Nominalists had probably prepossessed him, in his early years, in favour of some of the theological tenets of Occam; and afterwards prevented him from testifying his disapprobation of them so explicitly and decidedly as Melancthon and other reformers have done.

¹ "The theological system (says the learned and judicious Mosheim) that *now* prevails in the Lutheran academies, is not of the same tenor or spirit with that which was adopted in the infancy of the Reformation. The glorious defenders of religious liberty, to whom we owe the various blessings of the Reformation, could not, at once, behold the truth in all its lustre, and in all its extent; but, as usually happens to persons that have been long accustomed to the darkness of ignorance, their approaches towards knowledge were but slow, and their views of things but imperfect." (Maclaine's *Transl. of Mosheim*. London, 2d ed. vol. IV, p. 19.) He afterwards mentions one of Luther's early disciples, (Amsdorff,) "who was so far transported and infatuated by his excessive zeal for the supposed doctrine of his master, as to maintain, that *good works are an impediment to salvation*." Ibid. p. 39.

Mosheim, after remarking that "there are more excellent rules of conduct in the few practical productions of Luther and

A similar observation may be applied to the powerful appeals, in the early protestant writers, to the moral judgment and moral feelings of the human race, from those casuistical subtilties, with which the schoolmen and monks of the middle ages had studied to obscure the light of nature, and to stifle the voice of conscience. These subtilties were precisely analogous in their spirit to the *pia et religiosa calliditas*, afterwards adopted in the casuistry of the Jesuits, and so inimitably exposed by Pascal in the *Provincial Letters*. The arguments against them employed by the Reformers, cannot, in strict propriety, be considered as positive accessions to the stock of human knowledge; but what scientifick discoveries can be compared to them in value!

Melanchthon, than are to be found in the innumerable volumes of all the ancient *casuists* and *moralizers*," candidly acknowledges, "that the notions of these great men concerning the important science of morality were far from being sufficiently accurate or extensive. Melanchthon himself, whose exquisite judgment rendered him pecuniary capable of reducing into a compendious system the elements of every science, never seems to have thought of treating morals in this manner; but has inserted, on the contrary, all his practical rules and instructions, under the theological articles that relate to the *law, sin, freewill, faith, hope, and charity*." Mosheim's *Eccles. Hist.* vol. IV, pp. 23, 24.

The same author elsewhere observes, that "the progress of morality among the reformed was obstructed by the very same means that retarded its improvement among the Lutherans; and that it was left in a rude and imperfect state by Calvin and his associates. It was neglected amidst the tumult of controversy; and, while every pen was drawn to maintain certain systems of doctrine, few were employed in cultivating that master science which has *virtue, life, and manners* for its objects." Ibid. pp. 120, 121.

¹ "Et tamen ni doctores, *angelici, cherubici, seraphici* non modo universam philosophiam ac theologiam erroribus quam plurimis inquinarent; verum etiam in philosophiam moralem invexere sacerrima ista principia *probabilissimi, methodi dirigendi intentionem, reservationis mentalis, peccati philosophici*, quibus *Jesuitae* etiam-

From this period may be dated the decline¹ of that worst of all heresies of the Romish church, which, by opposing Revelation to reason, endeavoured to extinguish the light of both; and the absurdity (so happily described by Locke) became every day more manifest, of attempting “to persuade men to put out their eyes, that they might the better receive the remote light of an invisible star by a telescope.”

In the meantime, a powerful obstacle to the progress of practical morality and of sound policy, was superadded to those previously existing in Catholick countries, by the rapid growth and extensive influence of the Machiavellian school. The founder of this new sect (or to speak more correctly, the systematizer and apostle of its doctrines) was born as early as 1469, that is, about ten years before Luther; and, like that reformer, acquired, by the commanding superiority of his genius, an astonishing ascendant (though of a very different nature) over the minds of his followers. No writer, certainly, either in ancient or in mo-

num mirifice delectantur.” Heinecc. *Elem. Histor. Phil.* § cii. See also the references.

With respect to the ethicks of the Jesuits, which exhibit a very fair picture of the general state of that science, prior to the reformation, see the *Provincial Letters*; Mosheim’s *Ecclesiastical History*, vol. IV, p. 354; Dornford’s *Translation of Putter’s Historical Development of the present Political Constitution of the Germanick Empire*, (vol. II, p. 6); and the Appendix to Penrose’s *Bampton Lectures*.

¹ I have said, *the decline of this heresy*, for it was by no means *immediately* extirpated even in the reformed churches. “As late as the year 1598, Daniel Hofman, Professor of Divinity in the University of Helmstadt, laying hold of some particular opinions of Luther, extravagantly maintained, that philosophy was the mortal enemy of religion; that truth was divisible into two branches, the one *philosophical* and the other *theological*; and that what was *true* in philosophy was *false* in theology.” Mosheim, vol. IV, p. 18.

dern times, has ever united, in a more remarkable degree, a greater variety of the most dissimilar and seemingly the most discordant gifts and attainments;—a profound acquaintance with all those arts of dissimulation and intrigue, which, in the petty cabinets of Italy, were then universally confounded with political wisdom;—an imagination familiarized to the cool contemplation of whatever is perfidious or atrocious in the history of conspirators and of tyrants;—combined with a graphical skill in holding up to laughter the comparatively harmless follies of ordinary life. His dramattick humour has been often compared to that of Moliere; but it resembles it rather in comick force, than in benevolent gayety, or in chastened morality. Such as it is, however, it forms an extraordinary contrast to that strength of intellectual character, which, in one page, reminds us of the deep sense of Tacitus, and in the next, of the dark and infernal policy of Cæsar Borgia. To all this must be superadded a purity of taste, which has enabled him, as an historian, to rival the severe simplicity of the Grecian masters; and a sagacity in combining historical facts, which was afterwards to afford lights to the school of Montesquieu.

Eminent, however, as the talents of Machiavel unquestionably were, he cannot be numbered among the benefactors of mankind. In none of his writings, does he exhibit any marks of that lively sympathy with the fortunes of the human race, or of that warm zeal for the interests of truth and justice, without the guidance of which, the highest mental endowments, when applied to moral or to political researches, are in perpetual danger of mistaking their way. What is still more remarkable, he seems to have been altogether blind to the mighty changes in human affairs, which, in consequence of the recent invention of printing, were about to result from the progress of Reason

and the diffusion of Knowledge. Through the whole of his *Prince* (the most noted as well as one of the latest of his publications) he proceeds on the supposition, that the sovereign has no other object in governing, but his own advantage; the very circumstance which, in the judgment of Aristotle, constitutes the essence of the worst species of tyranny.¹ He assumes also the possibility of retaining mankind in perpetual bondage by the old policy of the *double doctrine*; or, in other words, by enlightening the few, and hoodwinking the many;—a policy less or more practised by statesmen in all ages and countries; but which (wherever the freedom of the press is respected) cannot fail, by the insult it offers to the discernment of the multitude, to increase the insecurity of those who have the weakness to employ it. It has been contended, indeed, by some of Machiavel's apologists, that his real object in unfolding and systematizing the mysteries of *King-Craft*, was to point out indirectly to the governed the means by which the encroachments of their rulers might be most effectually resisted; and, at the same time, to satirize, under the ironical mask of loyal and courtly admonition, the characteristical vices of princes.² But, although this hypothesis has been sanctioned by several distinguished names, and derives some verisimilitude from various incidents in the author's life, it will be found, on examination, quite untenable; and accordingly it is now, I believe, very generally rejected. One thing is certain, that if such were actually Machiavel's views, they were much too

¹ "There is a third kind of tyranny, which most properly deserves that odious name, and which stands in direct opposition to royalty; it takes place when one man, the worst perhaps and basest in the country; governs a kingdom, with no other view than the advantage of himself and his family." Aristotle's *Politick's*, Book vi, chap. x. See Dr. Gillie's Translation.

² See Note C.

refined for the capacity of his royal pupils. By many of these his book has been adopted as a manual for daily use ; but I have never heard of a single instance, in which it has been regarded by this class of students as a disguised panegyrick upon liberty and virtue. The question concerning the *motives* of the author is surely of little moment, when experience has enabled us to pronounce so decidedly on the practical *effects* of his precepts.

“ About the period of the Reformation,” says Condorcet, “ the principles of religious Machiavelism had become the *only* creed of princes, of ministers, and of pontiffs ; and the same opinions had contributed to corrupt philosophy. What code, indeed, of morals,” he adds, “ was to be expected from a system, of which one of the principles is,—that it is necessary to support the morality of the people by false pretences,—and that men of enlightened minds have a right to retain others in the chains from which they have themselves contrived to escape !” The fact is perhaps stated in terms somewhat too unqualified ; but there are the best reasons for believing, that the exceptions were few, when compared with the general proposition.

The consequences of the prevalence of such a creed among the rulers of mankind were such as might be expected. “ Infamous crimes, assassinations, and poisonings (says a French historian,) prevailed more than ever. They were thought to be the growth of Italy, where the rage and weakness of the opposite factions conspired to multiply them. Morality gradually disappeared, and with it all security in the intercourse of life. The first principles of duty were obliterated by the joint influence of atheism and of superstition.”¹

¹ Millot.

And here, may I be permitted to caution my readers against the common error of confounding the double doctrine of Machiavellian politicians, with the benevolent reverence for established opinions, manifested in the noted maxim of Fontenelle,—“that a wise man, even when his hand was full of truths, would often content himself with opening his little finger?” Of the advocates for the former, it may be justly said, that “they love darkness rather than light, *because their deeds are evil* ;” well knowing (if I may borrow the words of Bacon,) “that the open daylight doth not shew the masks and mummeries, and triumphs of the world, half so stately as candlelight.” The philosopher, on the other hand, who is duly impressed with the latter, may be compared to the oculist, who, after removing the cataract of his patient, prepares the still irritable eye, by the glimmering dawn of a darkened apartment, for enjoying in safety the light of day. ¹

¹ How strange is the following misrepresentation of Fontenelle’s fine and deep saying, by the comparatively coarse hand of the Baron de Grimm ! “Il disoit, que s’il eût tenu la vérité dans ses mains comme un oiseau, il l’auroit étouffée, tant il regardoit le plus beau présent du ciel inutile et dangereux pour le genre humain.” (*Mémoires Historiques, &c.* par le Baron de Grimm. Londres, 1814. Tome I, p. 340.) Of the complete inconsistency of this statement, not only with the testimony of his most authentick biographers, but with the general tenor both of his life and writings, a judgment may be formed from an expression of D’Alembert, in his very ingenious and philosophical parallel between Fontenelle and La Motte. “Tous deux ont porté trop loin leur revolte décidée, quoique douce en apparence, contre les dieux et les lois du Parnasse ; mais la liberté des opinions de la Motte semble tenir plus intimement à l’intérêt personnel qu’il avoit de les soutenir ; et la liberté des opinions de Fontenelle à l’intérêt général, peut être quelquefois mal entendu, qu’il prenoit au progrès de la raison dans tous les genres.” What follows may be regarded in the light of a comment on the maxim above quoted : “La finesse de la Motte est plus développée, celle de Fontenelle laisse plus à deviner à son lecteur. La Motte, sans jamais en trop dire, n’oublie rien de ce que son sujet lui présente, met

Machiavel is well known to have been, at bottom, no friend to the priesthood ; and his character has been stigmatized by many of the order with the most opprobrious epithets. It is nevertheless certain, that to *his* maxims the royal defenders of the catho'ick faith have been indebted for the spirit of that policy which they have uniformly opposed to the innovations of the Reformers. The *Prince* was a favourite book of the Emperour Charles V ; and was called the *Bible* of Catharine of Medicis. At the court of the latter, while Regent of France, those who approached her are said to have professed openly its most atrocious maxims ; particularly *that* which recommends to sovereigns not to commit crimes by halves. The Italian cardinals, who are supposed to have been the secret instigators of the massacre of St. Bartholomew, were bred in the same school.¹

It is observed by Mr. Hume, that “there is scarcely any maxim in the *Prince*, which subsequent experience has not entirely refuted.” “Machiavel,” says the same writer, “was certainly a great genius ; but having confined his study to the furious and tyrannical governments of ancient times, or to the little disorderly principalities of Italy, his reasonings, especially upon monarchical governments, have been found extremely defective. The errors of this politician proceeded, in a great measure, from his having lived in too early an age of the world, to be a good judge of political truth.”²

habilement tout en œuvre, et semble craindre perdre par des réticences trop subtiles quelqu'un de ses avantages ; Fontenelle, sans jamais être obscur, excepté pour ceux qui ne méritent pas même qu'on soit clair, se ménage à la fois et le plaisir de sous-entendre, et celui d'espérer qu'il sera pleinement entendu par ceux qui en sont dignes.” *Eloge de la Motte.*

¹ Voltaire, *Essay on Universal History.*

² *Essay on Civil Liberty.*

To these very judicious remarks it may be added, that the bent of Machiavel's mind seems to have disposed him much more strongly to combine and to generalize his historical reading, than to remount to the first principles of political science, in the constitution of human nature, and in the immutable truths of morality. His conclusions, accordingly, ingenious and refined as they commonly are, amount to little more (with a few very splendid exceptions) than empirical results from the events of past ages. To the student of ancient history they may be often both interesting and instructive ; but, to the modern politician, the most important lesson they afford is, the danger, in the present circumstances of the world, of trusting to such results, as maxims of universal application, or of permanent utility.

The progress of political philosophy, and along with it of morality and good order, in every part of Europe, since the period of which I am now speaking, forms so pleasing a comment on the profligate and shortsighted policy of Machiavel, that I cannot help pausing for a moment to remark the fact. In stating it, I shall avail myself of the words of the same profound writer, whose strictures on Machiavel's *Prince* I had already occasion to quote. "Though all kinds of government," says Mr. Hume, "be improved in modern times, yet monarchical government seems to have made the greatest advances towards perfection. It may now be affirmed of civilized monarchies, what was formerly said of republicks alone, that they are a government of laws, not of men. They are found susceptible of order, method, and constancy, to a surprising degree. Property is there secure, industry encouraged, the arts flourish, and the prince lives secure among his subjects, like a father among his children. There are, perhaps, and have been for two centuries, near two

hundred absolute princes, great and small, in Europe; and allowing twenty years to each reign, we may suppose that there have been in the whole two thousand monarchs or *tyrants*, as the Greeks would have called them. Yet of these there has not been one, not even Philip II of Spain, so bad as Tiberius, Caligula, Nero, or Domitian, who were four in twelve among the Roman emperours.”¹

For this very remarkable fact, it seems difficult to assign any cause equal to the effect, but the increased diffusion of knowledge (imperfect, alas! as this diffusion still is) by means of the Press; which, while it has raised, in free states, a growing bulwark against the oppression of rulers, in the light and spirit of the people, has, even under the most absolute governments, had a powerful influence—by teaching princes to regard the wealth and prosperity and instruction of their subjects as the firmest basis of their grandeur—in directing their attention to objects of national and permanent utility. How encouraging the prospect thus opened of the future history of the world! And what a motive to animate the ambition of those, who, in the solitude of the closet, aspire to bequeath their contributions, how slender soever, to the progressive mass of human improvement and happiness!

In the bright constellation of scholars, historians, artists, and wits, who shed so strong a lustre on Italy during that splendid period of its history which commences with the revival of letters, it is surprising how few names occur, which it is possible to connect, by any palpable link, with the philosophical or political speculations of the present times. As an original and profound thinker, the genius of Machiavel completely eclipses that of all his contemporaries. Not that Italy was then destitute of

¹ *Essay on Civil Liberty.*

writers who pretended to the character of philosophers ; but as their attempts were, in general, limited to the exclusive illustration and defence of some one or other of the ancient systems for which they had conceived a predilection, they added but little of their own to the stock of useful knowledge ; and are now remembered chiefly from the occasional recurrence of their names in the catalogues of the curious, or in works of philological erudition. The zeal of Cardinal Bessarion, and of Marsilius Ficinus, for the revival of the Platonick philosophy, was more peculiarly remarkable ; and, at one time, produced so general an impression, as to alarm the followers of Aristotle for the tottering authority of their master. If we may credit Launoius, this great revolution was on the point of being actually accomplished, when Cardinal Bellarmine warned Pope Clement VIII of the peculiar danger of shewing any favour to a philosopher whose opinions approached so nearly as those of Plato to the truths revealed in the Gospel. In what manner Bellarmine connected his conclusions with his premises, we are not informed. To those who are uninitiated in the mysteries of the conclave, his inference would certainly appear much less logical than that of the old Roman Pagans, who petitioned the Senate to condemn the works of Cicero to the flames, as they predisposed the minds of those who read them for embracing the Christian faith.

By a small band of bolder innovators, belonging to this golden age of Italian literature, the Aristotelian doctrines were more directly and powerfully assailed. Laurentius Valla, Marius Nizolius, and Franciscus Patricius,¹ have all

¹ His *Discussiones Peripateticæ* were printed at Venice in 1571. Another work, entitled *Nova de Universis Philosophia*, also printed at Venice, appeared in 1593. I have never happened to meet with either ; but from the account given of the author by

of them transmitted their names to posterity as philosophical reformers, and, in particular, as revolters against the authority of the Stagirite. Of the individuals just mentioned, Nizolius is the only one who seems entitled to maintain a permanent place in the annals of modern science. His principal work, entitled *Antibarbarus*,¹ is not only a bold invective against the prevailing ignorance and barbarism of the schools, but contains so able an argument against the then fashionable doctrine of the Realists concerning *general ideas*, that Leibnitz thought it worth while, a century afterwards, to republish it, with the addition of a long and valuable preface written by himself.

At the same period with Franciscus Patricius, flourished another learned Italian, Albericus Gentilis, whose writings seem to have attracted more notice in England and Germany than in his own country. His attachment to the re-

Thuanus, he does not seem to have attracted that notice from his contemporaries, to which his learning and talents entitled him. (Thuan. *Hist. Lib.* cxix, xvii.) His *Discussiones Peripateticæ* are mentioned by Brucker in the following terms: *Opus egregium, doctum, varium, luculentum, sed invidia odioque in Aristotelem plenum satis superque.*" (*Hist. Phil.* Tom. IV, p. 425.) The same very laborious and candid writer acknowledges the assistance he had derived from *Patricius* in his account of the Peripatetick philosophy.—“In qua tractatione fatemur egregiam enitere Patricii doctrinam, ingenii elegantiam prorsus admirabilem, et, quod primo loco ponendum est, insolitam veteris philosophiæ cognitionem, cujus ope nos Peripateticæ disciplinæ historiæ multoties lucem attulisse, grati suis locis professi sumus.” *Ibid.* p. 426.

¹ *Antibarbarus, sive de Veris Principiis et Vera Ratione Philosophandi contra Pseudo-philosophos.* Parmæ, 1553. “Les faux philosophes,” dit Fontenelle, “etoient tous les scholastiques passés et présents; et Nizolius s’élève avec la dernière hardiesse contre leurs idées monstrueuses et leur langage barbare. Le long et constante admiration qu’on avoit eu pour Aristote, ne prouvoit, disoit-il, que la multitude des sots et la durée de la sottise.” The merits of this writer are much too lightly estimated by Brucker. See *Hist. Phil.* Tom. IV, Pars I, pp. 91, 92.

formed faith having driven him from Italy, he sought an asylum at Oxford, where he published, in 1588, a book *de Jure Belli*; and where he appears to have read lectures on Natural Jurisprudence, under the sanction of the University. His name has already sunk into almost total oblivion; and I should certainly not have mentioned it on the present occasion, were it not for his indisputable merits as the precursor of Grotius, in a department of study which, forty years afterwards, the celebrated treatise *De Jure Belli et Pacis* was to raise to so conspicuous a rank among the branches of academical education. The avowed aim of this new science, when combined with the anxiety of Gentilis to counteract the effect of Machiavel's *Prince*, by representing it as a warning to subjects rather than as a manual of instruction for their rulers, may be regarded as satisfactory evidence of the growing influence, even at that era, of better ethical principles than those commonly imputed to the Florentine Secretary.¹

The only other Italian of whom I shall take notice at present, is Campanella;² a philosopher now remembered chiefly in consequence of his eccentric character and eventful life, but of whom Leibnitz has spoken in terms of such high admiration, as to place him in the same line with Bacon. After looking into several of his works with some

¹ The claims of Albericus Gentilis to be regarded as the father of *Natural Jurisprudence*, are strongly asserted by his countryman Lampredi, in his very judicious and elegant work, entitled, *Juris Publici Theoremata*, published at Pisa in 1782. "Hic primus jus aliquod Belli et esse et tradi posse excogitavit, et Belli et Pacis regulas explanavit primus, et fortasse in causa fuit cur Grotius opus suum conscribere aggrediretur; dignus sane qui prae ceteris memoretur, Italiae enim, in qua ortus erat, et unde Juris Romani disciplinam hauserat, gloriam auxit, effecitque ut quae fuerat bonarum artium omnium restitutrix et alatrix, eadem esset et prima Jurisprudentiae Naturalis magistra."

² Born 1568, died 1639.

attention, I must confess, I am at a loss to conceive upon what grounds the eulogy of Leibnitz proceeds; but as it is difficult to suppose, that the praise of this great man was, in any instance, the result of mere caprice, I shall put it in the power of my readers to judge for themselves, by subjoining a faithful translation of his words. I do this the more willingly, as the passage itself (whatever may be thought of the critical judgments pronounced in it,) contains some general remarks on *intellectual character*, which are in every respect worthy of the author.

“Some men, in conducting operations where an attention to minutiae is requisite, discover a mind vigorous, subtile, and versatile, and seem to be equal to any undertaking, how arduous soever. But when they are called upon to act on a greater scale, they hesitate and are lost in their own meditations; distrustful of their judgment, and conscious of their incompetency to the scene in which they are placed: men, in a word, possessed of a genius rather acute than comprehensive. A similar difference may be traced among authors. What can be more acute than Descartes in Physicks, or than Hobbes in Morals! And yet, if the one be compared with Bacon, and the other with Campanella, the former writers seem to grovel upon the earth,—the latter to soar to the Heavens, by the vastness of their conceptions, their plans, and their enterprises, and to aim at objects beyond the reach of the human powers. The former, accordingly, are best fitted for delivering the first elements of knowledge, the latter for establishing conclusions of important and general application.”¹

¹ Leibnit. *Opera*, vol. vi, p. 303, ed. Dutens.—It is probable that, in the above passage, Leibnitz alluded more to the elevated tone of Campanella's reasoning on moral and political subjects, when contrasted with that of Hobbes, than to the intellectual superiority of the former writer above the latter. No philosopher, certainly, has spoken with more reverence than

The annals of France, during this period, present very scanty materials for the History of Philosophy. The name of the Chancellor De l'Hopital, however, must not be passed over in silence. As an author, he does not rank high; nor does he seem to have at all valued himself on the careless effusions of his literary hours; but, as an upright and virtuous magistrate, he has left behind him a reputation unrivalled to this day.¹ His wise and indulgent principles on the subject of religious liberty, and the steadiness with which he adhered to them, under circumstances of extraordinary difficulty and danger, exhibit a splendid contrast to the cruel intolerance, which, a few years before, had disgraced the character of an illustrious Chancellor of England. The same philosophical and truly catholick spirit distinguished his friend, the President de Thou;² and gives the principal charm to the just-

Campanella has done, on various occasions, of the dignity of human nature. A remarkable instance of this occurs in his eloquent comparison of the *human hand* with the organs of touch in other animals. (*Vide* Campan. *Physiolog.* cap. xx, Art. 2.) Of his *Political Aphorisms* (which form the third part of his treatise on *Morals*,) a sufficient idea for our purpose is conveyed by the concluding *corollary*, "*Probitas custodit regem populosque; non autem indocta Machiavellistarum astutia.*" On the other hand, Campanella's works abound with immoralities and extravagancies far exceeding those of Hobbes. In his idea of a perfect commonwealth (to which he gives the name of *Civitas Solis*,) the impurity of his imagination, and the unsoundness of his judgment, are equally conspicuous. He recommends, under certain regulations, a community of women; and, in every thing connected with procreation, lays great stress on the opinions of astrologers.

¹ Magistrat au-dessus de tout eloge; et d'après lequel on a jugé tous ceux qui ont osé s'asseoir sur ce même tribunal sans avoir son courage ni ses lumières." Henault, *Abrégé Chronologique*.

² "One cannot help admiring," says Dr. Jortin, "the decent manner, in which the illustrious Thuanus hath spoken of Cal-

ly admired preface prefixed to his history. In tracing the progress of the human mind during the sixteenth century, such insulated and anomalous examples of the triumph of reason over superstition and bigotry, deserve attention, not less than what is due, in a history of the experimental arts, to Friar Bacon's early anticipation of gunpowder, and of the telescope.

Contemporary with these great men was Bodin (or Bodinus,) ¹ an eminent French lawyer, who appears to have been one of the first that united a philosophical turn of thinking with an extensive knowledge of jurisprudence and of history. His learning is often ill digested, and his conclusions still oftener rash and unsound: yet it is but justice to him to acknowledge, that, in his views of the philosophy of law, he has approached very nearly to some leading ideas of Lord Bacon; ² while, in his refined combinations of historical facts, he has more than once struck into a train of speculation, bearing a strong resemblance to that afterwards pursued by Montesquieu. ³ Of

vin:” Acri vir ac vehementi ingenio, et admirabili facundia praeditus; tum inter protestantes magni nominis Theologus.” (*Life of Erasmus*, p. 555.) The same writer has remarked the *great decency and moderation* with which Thuanus speaks of Luther. *Ibid.* p. 113.

¹ Born 1530, died 1596.

² See, in particular, the preface to his book, entitled *Methodus ad facilem Historiarum cognitionem*.

³ See the work *De la République*, *passim*. In this treatise there are two chapters singularly curious, considering the time when they were written; the second and third chapters of the sixth book. The first is entitled *Des Finances*; the second, *Le Moyen d'empêcher que les Monnoyes soyent alterées de Prix ou falsifiées*. The reasonings of the Author on various points there treated of will be apt to excite a smile among those who have studied the *Inquiry into the Wealth of Nations*; but it reflects no small credit on a lawyer of the sixteenth century to have subjected such questions to philosophical examination;

this resemblance, so remarkable an instance occurs in his chapter on the moral effects of Climate, and on the attention due to this circumstance by the legislator, that it has repeatedly subjected the author of *the Spirit of Laws* (but in my opinion without any good reason) to the imputation of plagiarism.¹ A resemblance to Montesquieu, still more honourable to Bodinus, may be traced in their common attachment to religious as well as to civil liberty. To have caught, in the sixteenth century, somewhat of the philosophical spirit of the eighteenth, reflects less credit on the force of his mind, than to have imbibed, in the midst of the theological controversies of his age, those lessons of mutual forbearance and charity, which a long and sad experience of the fatal effects of persecution has, to this day, so imperfectly taught to the most enlightened nations of Europe.

As a specimen of the liberal and moderate views of this philosophical politician, I shall quote two short passages from his Treatise *De la République*, which seem to me objects of considerable curiosity, when contrasted with the general spirit of the age in which they were written. The first relates to liberty of conscience, for which he was a strenuous and intrepid advocate, not only in his publications, but as a member of the *Etats Généraux*, assembled at Blois in 1576. “The mightier that a man is (says

and to have formed so just a conception, as Bodin appears evidently to have done, not only of the object, but of the importance of the modern science of political economy.

Thuanus speaks highly of Bodin's dissertations *De re Monetaria*, which I have never seen.—The same historian thus expresses himself with respect to the work *De Republica*: “Opus in quo ut omni scientiarum genere non tincti sed imbuti ingenii fidem fecit, sic nonnullis, qui recte judicant, non omnino ab ostentationis innato genti vitio vacuum se probavit. *Hist. Lib. cxvii, ix.*

¹ See Note D.

Bodin) the more justly and temperately he ought to behave himself towards all men, but especially towards his subjects. Wherefore the senate and people of Basil did wisely, who, having renounced the Bishop of Rome's religion, would not, upon the sudden, thrust the monks and nuns, with the other religious persons, out of their abbeys and monasteries, but only took order, that, as they died, they should die both for themselves and their successors, expressly forbidding any new to be chosen in their places, so that, by that means, their colleges might, by little and little, by the death of the fellows, be extinguished. Whereby it came to pass, that all the rest of the Carthusians, of their own accord, forsaking their cloisters, yet one of them all alone for a long time remained therein, quietly and without any disturbance, holding the right of his convent, being never enforced to change either his place, or habit, or old ceremonies, or religion before by him received. The like order was taken at Coire in the diet of the Grisons; wherein it was decreed, that the ministers of the reformed religion should be maintained of the profits and revenues of the church, the religious men nevertheless still remaining in their cloisters and convents, to be by their death suppressed, they being now prohibited to choose any new instead of them which died. By which means, they which professed the new religion, and they who professed the old, were both provided for.¹

¹ Book iv, chap. iii.—The book from which this quotation is taken was published only twenty-three years after the murder of Servetus at Geneva; an event which leaves so deep a stain on the memory not only of Calvin, but on that of the milder and more charitable Melanchthon. The epistle of the latter to Bullinger, where he applauds the conduct of the judges who condemned to the flames this incorrigible heretick, affords the most decisive of all proofs, how remote the sentiments of the most enlightened Fathers of the Reformation were from those Christian and philosophical principles of toleration, to which their noble

the eccentricity of his religious tenets was such, as to incline the candid mind of Grotius to suspect him of a secret leaning to the Jewish faith.¹

In contemplating the characters of the eminent persons who appeared about this era, nothing is more interesting and instructive, than to remark the astonishing combination, in the same minds, of the highest intellectual endowments, with the most deplorable aberrations of the understanding; and even, in numberless instances, with the most childish superstitions of the multitude. Of this apparent inconsistency, Bodinus does not furnish a solitary example. The same remark may be extended, in a greater or less degree, to most of the other celebrated names hitherto mentioned. Melanchthon, as appears from his letters, was an interpreter of dreams, and a caster of nativities;² and Luther not only sanctioned, by his authority, the popular fables about the sexual and prolific intercourse of Satan with the human race, but seems to have seriously believed that he had himself frequently seen the *arch enemy* face to face, and held arguments with him on points of theology.³ Nor was the study of the severer sciences, on all occasions, an effectual remedy against such illusions of the imagination. The *sagacious* Kepler was an astrologer and a visionary; and his friend

this we have the testimony of the illustrious historian just mentioned. (Thuanus, Lib. cxvii, ix.) Nor did it recommend the author to the good opinion of the Catholick church, having been formally condemned and prohibited by the Roman Inquisition. The reflection of the Jesuit Martin del Rio on this occasion is worth transcribing “*Adco lubricum et periculosum de his disserere, nisi Deum semper, et catholicam fidem, ecclesiaeque Romanae censuram tanquam cynosuram sequaris.*” *Disquisitionum Magicarum*, Libri Sex. Auctore Martino del Rio, Societatis Jesu Presbytero. Venet. 1640, p. 8.

¹ *Epist. ad Cordesium*, (quoted by Bayle.)

² Jortin's *Life of Erasmus*, p. 156.

³ See Note E.

Tycho Brahe, the *Prince of Astronomers*, kept an idiot in his service, to whose prophecies he listened as revelations from above.¹ During the long night of Gothick barbarism, the intellectual world had again become, like the primitive earth, “without form and void;” the light had already appeared; “and God had seen the light that it was good;” but the time was not yet come to “divide it from the darkness.”²

¹ See *the Life of Tycho Brahe*, by Gassendi.

² I have allotted to Bodin a larger space than may seem due to his literary importance; but the truth is, I know of no political writer, of the same date, whose extensive and various and discriminating reading appears to me to have contributed more to facilitate and to guide the researches of his successors; or whose references to ancient learning have been more frequently transcribed without acknowledgment. Of late, his works have fallen into very general neglect; otherwise it is impossible that so many gross mistakes should be current about the scope and spirit of his principles. By many he has been mentioned as a zealot for republican forms of Government (probably for no better reason than that he chose to call his book a *Treatise De Republica*;) whereas, in point of fact, he is uniformly a warm and able advocate for monarchy; and, although no friend to tyranny, has, on more than one occasion, carried his monarchical principles to a very blameable excess. (See, in particular, chapter fourth and fifth of the Sixth Book.) On the other hand, Grouvelle, a writer of some note, has classed Bodin with Aristotle, as an advocate for domestick slavery. “The reasonings of both,” he says, “are refuted by Montesquieu.” (*De l'autorité de Montesquieu dans la Révolution présente*. Paris, 1789.) Whoever has the curiosity to compare Bodin and Montesquieu together, will be satisfied, that, on this point, their sentiments were exactly the same; and that, so far from refuting Bodin, Montesquieu has borrowed from him more than one argument in support of his general conclusion.

The merits of Bodin have been, on the whole, very fairly estimated by Bayle, who pronounces him “one of the ablest men that appeared in France during the sixteenth century.” “Si nous voulons disputer à Jean Bodin la qualité d'écrivain exact et judicieux, laissons lui sans controverse, un grand génie, un vaste savoir, une mémoire et une lecture prodigieuses.”

In the midst of the disorders, both political and moral, of that unfortunate age, it is pleasing to observe the anticipations of brighter prospects, in the speculations of a few individuals. Bodinus himself is one of the number;¹ and to his name may be added that of his countryman and predecessor Budæus.² But, of all the writers of the sixteenth century, Ludovicus Vives seems to have had the liveliest and the most assured foresight of the new career on which the human mind was about to enter. The following passage from one of his works would have done no discredit to the *Novum Organon*: “The similitude which many have fancied between the superiority of the moderns to the ancients, and the elevation of a dwarf on the back of a giant, is altogether false and puerile. Neither were *they* giants, nor are we dwarfs, but all of us men of the same standard,—and *we* the taller of the two, by adding their

¹ See, in particular, his *Method of Studying History*, chap. vii, entitled *Confutatio eorum qui quatuor Monarchias Aureaque Secula statuerunt*. In this chapter, after enumerating some of the most important discoveries and inventions of the moderns, he concludes with mentioning the art of printing, of the value of which he seems to have formed a very just estimate. “Una Typographia cum omnibus veterum inventis certare facile potest. Itaque non minus peccant, qui à veteribus aiunt omnia comprehensa, quam qui illos de veteri multarum artium possessione deturbant. Habet Natura scientiarum thesauros innumera- biles, qui nullis aetatibus exhauriri possunt.” In the same chapter Bodinus expresses himself thus: “aetas illa quam *auream* vocant, si ad nostram conferatur, *ferrea* videri possit.”

² The works of Budæus were printed at Basle, in four volumes folio, 1557. My acquaintance with them is much too slight to enable me to speak of them from my own judgment. No scholar certainly stood higher in the estimation of his age. “Quo viro,” says Ludovicus Vives, “Gallia acutiore ingenio, acriore judicio, exactiore diligentia, majore eruditione nullum unquam produxit; hac vero aetate nec Italia quidem.” The praise bestowed on him by other contemporary writers of the highest eminence is equally lavish.

height to our own: provided always, that we do not yield to them in study, attention, vigilance, and love of truth; for, if these qualities be wanting, so far from mounting on the giant's shoulders, we throw away the advantages of our own just stature, by remaining prostrate on the ground." ¹

I pass over, without any particular notice, the names of some French logicians who flourished about this period, because, however celebrated among their contemporaries, they do not seem to form essential links in the History of Science. The bold and persevering spirit with which Ramus disputed, in the university of Paris, the authority of Aristotle, and the persecutions he incurred by this philosophical heresy, entitle him to an honourable distinction from the rest of his brethren. He was certainly a man of uncommon acuteness as well as eloquence, and placed in a very strong light some of the most vulnerable parts of the Aristotelian logick; without, however, exhibiting any marks of that deep sagacity which afterwards enabled Bacon, Descartes, and Locke, to strike at the very roots of the system. His copious and not inelegant style as a writer, recommended his innovations to those who were dis-

¹ *Vives de Caus. Corrupt. Artium*, Lib. i. Similar ideas occur in the works of Roger Bacon: "Quanto juniores tanto perspicaciores, quia juniores posteriores successione temporum ingrediuntur labores priorum." (*Opus Majus*, edit. Jebb. p. 9.) Nor were they altogether overlooked by ancient writers. "Veniet tempus, quo ista quae latent nunc in lucem dies extrahet. et longioris aevi diligentia. Veniet tempus, quo posteri nostri tam aperta nos ignorasse mirabuntur." (Seneca, *Quaest. Nat.* Lib. vii, c. 25.) This language coincides exactly with that of the Chancellor Bacon; but it was reserved for the latter to illustrate the connexion between the progress of human *knowledge*, and of human *happiness*; or (to borrow his own phraseology) the connexion between the progress of knowledge, and the enlargement of man's *power* over the destiny of his own species. Among other passages to this purpose, See *Nov. Org.* Lib. i, cxxix.

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¹ *Vives de Caus. Corrupt. Artium*, Lib. i. Similar ideas occur in the works of Roger Bacon: "Quanto juniores tanto perspicaciores, quia juniores posteriores successione temporum ingrediuntur labores priorum." (*Opus Majus*, edit. Jebb. p. 9.) Nor were they altogether overlooked by ancient writers. "Veniet tempus, quo ista quae latent nunc in lucem dies extrahet. et longioris aevi diligentia. Veniet tempus, quo posterì nostri tam aperta nos ignorasse mirabuntur." (Seneca, *Quaest. Nat.* Lib. vii, c. 25.) This language coincides exactly with that of the Chancellor Bacon; but it was reserved for the latter to illustrate the connexion between the progress of human *knowledge*, and of human *happiness*; or (to borrow his own phraseology) the connexion between the progress of knowledge, and the enlargement of man's *power* over the destiny of his own species. Among other passages to this purpose, See *Nov. Org.* Lib. i, cxxix.

gusted with the barbarism of the schools;¹ while his avowed partiality for the reformed faith (to which he fell a martyr in the massacre of Paris,) procured many proselytes to his opinions in all the Protestant countries of Europe. In England his logick had the honour, in an age of comparative light and refinement, to find an expounder and methodiser in the author of *Paradise Lost*; and in some of our northern universities, where it was very early introduced, it maintained its ground till it was supplanted by the logick of Locke.

It has been justly said of Ramus, that, “although he had genius sufficient to shake the Aristotelian fabrick, he was unable to substitute any thing more solid in its place:” but it ought not be forgotten, that even *this* praise, scanty as it may *now* appear, involves a large tribute to his merits as a philosophical reformer. Before human reason was able to advance, it was necessary that it should first be released from the weight of its fetters.²

¹ To the accomplishments of Ramus as a writer, a very flattering testimony is given by an eminent English scholar, by no means disposed to overrate his merits as a logician. “*Pulsa tandem barbarie, Petrus Ramus politioris literaturae vir, ausus est Aristotelem acrius ubique et liberius incessere, universamque Peripateticam philosophiam exagitare. Ejus dialectica exiguo tempore fuit apud plurimos summo in pretio, maxime eloquentiae studiosos, idque odio scholasticorum quorum dictio et stylus ingrata fuerant auribus Ciceronianis.*” *Logicae Artis Compendium*, Auctore R. Sanderson, Episc. Lincoln, pp. 250, 251. Edit. Decima. Oxon. The first edition was printed in 1618.

² Dr. Barrow, in one of his mathematical lectures, speaks of Ramus in terms far too contemptuous. “Homo, ne quid gravius dicam, *argutulus et dicaculus.*”—“Sane vix indignationi meae tempero, quin illum accipiam pro suo merito, regeramque validius in ejus caput, quae contra veteres jactat convicia.” Had Barrow confined this censure to the weak and arrogant attacks made by Ramus upon Euclid (particulaly upon Euclid’s definition of Proportion,) it would not have been more than Ramus deserved; but it is evident he meant to extend it also to the more powerful

It is observed, with great truth, by Condorcet, that, in the times of which we are now speaking, “the science of political economy did not exist. Princes estimated not the number of men, but of soldiers in the state;—finance was merely the art of plundering the people, without driving them to the desperation that might end in revolt;—and governments paid no other attention to commerce, but that of loading it with taxes, of restricting it by privileges, or of disputing for its monopoly.”

The internal disorders then agitating the whole of Christendom, were still less favourable to the growth of this science, considered as a branch of speculative study. Religious controversies every where divided the opinions of the multitude;—involving those collateral discussions concerning the liberty of conscience, and the relative claims of sovereigns and subjects, which, by threatening to resolve society into its first elements, present to restless and aspiring spirits the most inviting of all fields for enterprise

attacks of the same reformer upon the logick of Aristotle. Of these there are many which may be read with profit even in the present times. I select one passage as a specimen, recommending it strongly to the consideration of those logicians who have lately stood forward as advocates for Aristotle’s *abecedarian* demonstrations of the syllogistick rules. “In Aristotelis arte, unius praecepti unicum exemplum est, ac saepissime nullum: Sed unico et singulari exemplo non potest artifex effici; pluribus opus est et dissimilibus. Et quidem, ut Aristotelis exempla tantummodo non falsa sint, qualia tamen sunt? Omne *b* est *a*: omne *c* est *b*: ergo omne *c* est *a*. Exemplum Aristotelis est puero à grammaticis et oratoribus venienti, et istam tutorum Mathematicorum linguam ignorant, novum et durum: et in totis Analyticis ista non Atticâ, non Ionicâ, non Doricâ, non Aeolicâ, non communi, sed geometricâ linguâ usus est Aristoteles, odiosâ pueris, ignotâ populo, à communi sensu remotâ, à rhetoricae usu et ab humanitatis usu alienissimâ” (P. Rami *pro Philosophica Parisiensis Academiae Disciplina Oratio*, 1550.) If these strictures should be thought too loose and declamatory, the reader may consult the fourth chapter (*De Conversionibus*) of the seventh book of Ramus’s *Dialectics*, where the same charge is urged, in my opinion, with irresistible force of argument.

and ambition. Amidst the shock of such discussions, the calm inquiries which meditate in silence the slow and gradual amelioration of the social order, were not likely to possess strong attractions, even to men of the most sanguine benevolence; and, accordingly, the political speculations of this period turn almost entirely on the comparative advantages and disadvantages of different forms of government; or on the still more alarming questions concerning the limits of allegiance and the right of resistance.

The dialogue of our illustrious countryman Buchanan, *De Jure Regni apud Scotos*, though occasionally disfigured by the keen and indignant temper of the writer, and by a predilection (pardonable in a scholar warm from the schools of ancient Greece and Rome) for forms of policy unsuitable to the circumstances of modern Europe, bears, nevertheless, in its general spirit, a closer resemblance to the political philosophy of the eighteenth century, than any composition which had previously appeared. The ethical paradoxes afterwards inculcated by Hobbes as the ground work of his slavish theory of government, are anticipated and refuted; and a powerful argument is urged against that doctrine of Utility which has attracted so much notice in our times. The political reflections, too, incidentally introduced by the same author in his *History of Scotland*, bear marks of a mind worthy of a better age than fell to his lot. Of this kind are the remarks with which he closes his narrative of the wanton cruelties exercised in punishing the murderers of James the First. In reading them, one would almost imagine, that one is listening to the voice of Beccaria or of Montesquieu. "After this manner," says the historian, "was the cruel death of James still more cruelly avenged. For punishments so far exceeding the measure of humanity, have less effect in deterring the multitude from crimes, than in rousing them

to greater efforts, both as actors and as sufferers. Nor do they tend so much to intimidate by their severity as by their frequency to diminish the terrors of the spectators. The evil is more peculiarly great, when the mind of the criminal is hardened against the sense of pain; for in the judgment of the unthinking vulgar, a stubborn confidence generally obtains the praise of heroick constancy.”

After the publication of this great work, the name of Scotland, so early distinguished over Europe by the learning and by the *fervid genius*¹ of her sons, disappears for more than a century and a half from the History of Letters.— But from this subject, so pregnant with melancholy and humiliating recollections, our attention is forcibly drawn to a mighty and auspicious light which, in a more fortunate part of the island, was already beginning to rise on the philosophical world.²

¹ Praefervidum Scotorum ingenium.

² That, at the end of the sixteenth century, the Scottish nation were advancing not less rapidly than their neighbours, in every species of mental cultivation, is sufficiently attested by their literary remains, both in the Latin language, and in their own vernacular tongue. A remarkable testimony to the same purpose occurs in the dialogue above quoted; the author of which had spent the best years of his life in the most polished society of the Continent. “As often,” says Buchanan, “as I turn my eyes to the niceness and elegance of our own times, the ancient manners of our forefathers appear sober and venerable, but withal rough and horrid.”—“Quoties oculos ad nostri temporis munditias et elegantiam refero, antiquitas illa sancta et sobria, sed *horrida* tamen, et nondum *satis expolita*, fuisse videtur.” (*De Jure Regni apud Scotos.*) One would think, that he conceived the taste of his countrymen to have then arrived at the *ne plus ultra* of national refinement,

Aurea nunc, olim sylvestribus horrida dumis.

CHAPTER II.

FROM THE PUBLICATION OF BACON'S PHILOSOPHICAL WORKS, TILL
THAT OF THE ESSAY ON HUMAN UNDERSTANDING.

SECTION I.

Progress of Philosophy in England during this period.

BACON.¹

THE state of science towards the close of the sixteenth century presented a field of observation singularly calculated to attract the curiosity, and to awaken the genius of Bacon; nor was it the least of his personal advantages, that as the son of one of Queen Elizabeth's ministers, he had a ready access, wherever he went, to the most enlightened society in Europe. While yet only in the seventeenth year of his age, he was removed by his father from Cambridge to Paris, where it is not to be doubted, that the novelty of the literary scene must have largely contributed to cherish the natural liberality and independence of his mind. Sir Joshua Reynolds has remarked, in one of his academical Discourses, that "every seminary of learning is surrounded with an atmosphere of floating knowledge, where every mind may imbibe somewhat congenial to its own original conceptions."² He might have added, with still greater truth, that it is an atmosphere, of

¹ Born 1561, died 1626.

² Discourse delivered at the opening of the Royal Academy, January 2, 1769.

which it is more peculiarly salutary, for those who have been elsewhere reared, to breathe the air. The remark is applicable to higher pursuits than were in the contemplation of this philosophical artist ; and it suggests a hint of no inconsiderable value for the education of youth.

The merits of Bacon, as the father of Experimental Philosophy, are so universally acknowledged, that it would be superfluous to touch upon them here. The lights which he has struck out in various branches of the Philosophy of Mind, have been much less attended to ; although the whole scope and tenour of his speculations shew, that to *this* study his genius was far more strongly and happily turned, than to that of the Material World. It was not, as some seem to have imagined, by sagacious anticipations of particular discoveries afterwards to be made in physicks, that his writings have had so powerful an influence in accelerating the advancement of that science. In the extent and accuracy of his *physical* knowledge, he was far inferior to many of his predecessors ; but he surpassed them all in his knowledge of the laws, the resources, and the limits of the human understanding. The sanguine expectations with which he looked forwards to the future, were founded solely on his confidence in the untried *capacities of the mind* ; and on a conviction of the possibility of invigorating and guiding, by means of logical rules, those faculties, which, in all our researches after truth, are the organs or instruments to be employed. “ Such rules,” as he himself has observed, “ do in some sort equal men’s wits, and leave no great advantage or preeminence to the perfect and excellent motions of the spirit. To draw a straight line, or to describe a circle, by aim of hand only, there must be a great difference between an unsteady and unpractised hand, and a steady and practised ; but to do it by rule or compass it is much alike.”

Nor is it merely as a logician that Bacon is entitled to notice on the present occasion. It would be difficult to name another writer prior to Locke, whose works are enriched with so many just observations on the intellectual phenomena. Among these, the most valuable relate to the laws of Memory, and of Imagination ; the latter of which subjects he seems to have studied with peculiar care. In one short but beautiful paragraph concerning *Poetry* (under which title may be comprehended all the various creations of this faculty) he has exhausted every thing that philosophy and good sense have yet had to offer, on what has been since called the *Beau Ideal* ; a topick, which has furnished occasion to so many over-refinements among the French criticks, and to so much extravagance and mysticism in the *cloud-capt* metaphysicks of the new German school.¹ In considering imagination as connected with the nervous system, more particularly as connected with that species of sympathy to which medical writers have given the name of *imitation*, he has suggested some very important hints, which none of his successors have hitherto prosecuted ;

¹ “ Cum mundus sensibilis sit anima rationali dignitate inferior, videtur *Poësis* haec humanae naturae largiri quae historia denegat ; atque animo umbris rerum utcunque satisfacere, cum solida haberi non possint. Si quis enim rem acutius introspiciat, firmum ex *Poësi* sumitur argumentum, magnitudinem rerum magis illustrem, ordinem magis perfectum, et varietatem magis pulchram, animae humanae complacere, quam in natura ipsa, post lapsum, reperiri ullo modo possit. Quapropter, cum res gestae et eventus, qui verae historiae subjiciuntur, non sint ejus amplitudinis, in qua anima humana sibi satisfaciât, praesto est *Poësis*, quae facta magis heroica confingat. Cum historia vera successus rerum, minime pro meritis virtutum et scelerum, narret, corrigit eam *Poësis*, et exitus, et fortunas, secundum merita, et ex lege Nemeseos, exhibet. Cum historia vera obvia rerum satietate et similitudine, animae humanae fastidio sit, reficit eam *Poësis*, inexpectata, et varia, et vicissitudinum plena canens. Adeo ut *Poësis* ista non solum ad delectationem, sed ad animi magnitudinem, et ad mores conferat,” (*De Aug. Scient. Lib. ii, cap. xiii.*)

and has, at the same time, left an example of cautious inquiry, worthy to be studied by all who may attempt to investigate the laws regulating the union between Mind and Body.¹ His illustration of the different classes of prejudices incident to human nature, is, in point of practical utility, at least equal to any thing on that head to be found in Locke; of whom it is impossible to forbear remarking, as a circumstance not easily explicable, that he should have resumed this important discussion, without once mentioning the name of his great predecessor. The chief improvement made by Locke, in the farther prosecution of the argument, is the application of Hobbes's theory of association, to explain in what manner these prejudices are originally generated.

¹ To this branch of the philosophy of mind, Bacon gives the title of *Doctrina de foedere, sive de communi vinculo animae et corporis*. (*De Aug. Scient. Lib. iv, cap. i.*) Under this article, he mentions, among other *desiderata*, an inquiry (which he recommends to physicians) concerning the influence of imagination over the body. His own words are very remarkable; more particularly, the clause in which he remarks the effect of fixing and concentrating the attention, in giving to ideal objects the power of realities over the belief. "Ad aliud quippiam, quod huc pertinet, parce admodum, nec pro rei subtilitate, vel utilitate, inquisitum est; quatenus scilicet *ipsa imaginatio animae vel cogitatio perquam fixa, et veluti in fidem quandam exaltata*, valeat ad immutandum corpus imaginantis." (*Ibid.*) He suggests also, as a curious problem, to ascertain how far it is possible to fortify and exalt the imagination; and by what means this may most effectually be done. The class of facts here alluded to, are manifestly of the same description with those to which the attention of philosophers has been lately called by the pretensions of Mesmer and of Perkins: "Atque huic conjuncta est disquisitio, quomodo imaginatio intendi et fortificari possit? Quippe, si imaginatio fortis tantarum sit virium, operae pretium fuerit nosse, quibus modis eam exaltari, et se ipsa majorem fieri detur? Atque hic oblique, nec minus periculose se insinuat palliatio quaedam et defensio maximae partis *Magiae Ceremonialis*." &c. &c. *De Aug. Scient. Lib. iv, cap. iii.*

In Bacon's scattered hints on topicks connected with the Philosophy of the Mind, strictly so called, nothing is more remarkable than the precise and just ideas they display of the proper aim of this science. He had manifestly reflected much and successfully on the operations of his own understanding, and had studied with uncommon sagacity the intellectual characters of others. Of his reflections and observations on both subjects, he has recorded many important results; and has in general stated them without the slightest reference to any physiological theory concerning their causes, or to any analogical explanations founded on the caprices of metaphorical language. If, on some occasions, he assumes the existence of *animal spirits*, as the medium of communication between Soul and Body, it must be remembered, that this was *then* the universal belief of the learned; and that it was at a much later period not less confidently avowed by Locke. Nor ought it to be overlooked (I mention it to the credit of *both* authors,) that in such instances the *fact* is commonly so stated, as to render it easy for the reader to detach it from the *theory*. As to the scholastick question concerning the nature and essence of mind,—whether it be extended or unextended? whether it have any relation to space or to time? or whether (as was contended by others) it exist in *every ubi*, but in *no place*?—Bacon has uniformly passed them over with silent contempt; and has probably contributed not less effectually to bring them into general discredit, by this indirect intimation of his own opinion, than if he had descended to the ungrateful task of exposing their absurdity.¹

¹ Notwithstanding the extravagance of Spinoza's own philosophical creed, he is one of the very few among Bacon's successors, who seem to have been fully aware of the justness, importance, and originality of the method pointed out in the *Novum Organon* for the study of the Mind. “Ad haec intelli-

While Bacon, however, so cautiously avoids these unprofitable discussions about the nature of Mind, he decidedly states his conviction, that the *faculties* of Man differ not merely in degree, but in kind, from the instincts of the brutes. "I do not, therefore," he observes on one occasion, "approve of that confused and promiscuous method in which philosophers are accustomed to treat of pneumatology ; as if the human Soul ranked above those of brutes, merely like the sun above the stars, or like gold above other metals."

Among the various topics started by Bacon for the consideration of future logicians, he did not overlook (what may be justly regarded in a practical view, as the most interesting of all logical problems) the question concerning the mutual influence of thought and of language on each other. "Men believe," says he, "that their reason governs their words ; but, it often happens, that words have power enough to *react* upon reason." This aphorism may be considered as the text of by far the most valuable part of Locke's Essay,—*that* which relates to the imperfections and abuse of words ; but it was not till within the last twenty years, that its depth and importance were perceived in all their extent.

genda, non est opus naturam mentis cognoscere, sed sufficit, mentis sive perceptionum historiolum concinnare modo illo quo VERULAMIUS docet." Spin. Epist. 42.

In order to comprehend the whole merit of this remark, it is necessary to know that, according to the Cartesian phraseology, which is here adopted by Spinoza, the word *perception* is a general term, equally applicable to all the intellectual operations. The words of Descartes himself are these : "Omnes modi cogitandi, quos in nobis experimur, ad duos generales referri possunt : quorum unus est, *perceptio*, sive operatio intellectus ; alius verò, *volitio*, sive operatio voluntatis. Nam sentire, imaginari, et pure intelligere, sunt tantum diversi modi percipiendi ; ut et cupere, avversari, affirmare, negare, dubitare, sunt diversi modi volendi." *Princ. Phil. Pars I, § 32.*

I need scarcely say, that I allude to the excellent Memoirs of M. Prevost and of M. Degerando, on “Signs considered in their connexion with the Intellectual Operations.” The anticipations formed by Bacon, of that branch of modern logick which relates to *Universal Grammar*, do no less honour to his sagacity. “Grammar,” he observes, “is of two kinds, the one literary, the other philosophical. The former has for its objects to trace the analogies running through the structure of a peculiar tongue, so as to facilitate its acquisition to a foreigner, or to enable him to speak it with correctness and purity. The latter directs the attention, *not* to the analogies which words bear to words, but to the analogies which words bear to things;”¹ or, as he afterwards explains himself more clearly, “to language considered as the sensible portraiture or image of the mental processes.” In farther illustration of these hints, he takes notice of the lights which the different genius of different languages reflect on the characters and habits of those by whom they were respectively spoken. “Thus,” says he, “it is easy to perceive, that the Greeks were addicted to the culture of the arts, the Romans engrossed with the conduct of affairs; inasmuch, as the technical distinctions introduced in the progress of refinement require the aid of compounded words; while the real business of life stands in no need of so artificial a phraseology.”² Ideas of this sort have, in the course of a very few years, already become common, and almost tritcal; but how different was the case two centuries ago!

With these sound and enlarged views concerning the Philosophy of the mind, it will not appear surprising to those who have attended to the slow and irregular advances

¹ *De Aug. Scient.* Lib. vi, cap. i.

² *Ibid.*

of human reason, that Bacon should occasionally blend incidental remarks, savouring of the habits of thinking prevalent in his time. A curious example of this occurs in the same chapter which contains his excellent definition or description of universal grammar. "This too," he observes, "is worthy of notice, that the ancient languages were full of declensions, of cases, of conjugations, of tenses, and of other similar inflections; while the modern, almost entirely destitute of these, indolently accomplish the same purpose by the help of prepositions, and of auxiliary verbs.—Whence," he continues, "may be inferred (however we may flatter ourselves with the idea of our own superiority,) that the human intellect was much more acute and subtile in ancient, than it now is in modern times."¹ How very unlike is this last reflection to the usual strain of Bacon's writings! It seems, indeed, much more congenial to the philosophy of Mr. Harris and of Lord Monboddo; and it has accordingly been sanctioned with the approbation of both these learned authors. If my memory does not deceive me, it is the only passage in Bacon's works, which Lord Monboddo has any where condescended to quote.

These observations afford me a convenient opportunity for remarking the progress and diffusion of *the philosophical spirit*, since the beginning of the seventeenth century. In the short passage just cited from Bacon, there are involved no less than two capital errors, which are now almost universally ranked, by men of education, among the grossest prejudices of the multitude. The one, that the declensions and conjugations of the ancient languages, and the modern substitution in their place, of prepositions and auxiliary verbs, are, both of them, the deliberate and systematical contrivances of speculative grammarians; the

¹ *De Aug. Scient. Lib. vi, cap. i.*

other (still less analogous to Bacon's general style of reasoning,) that the faculties of man have declined, as the world has grown older. Both of these errors may be now said to have disappeared entirely. The latter, more particularly, must, to the rising generation, seem so absurd, that it almost requires an apology to have mentioned it. That the capacities of the human mind have been in all ages the same; and that the diversity of phenomena exhibited by our species, is the result merely of the different circumstances in which men are placed, has been long received as an incontrovertible logical maxim; or rather, such is the influence of early instruction, that we are apt to regard it as one of the most obvious suggestions of common sense. And yet, till about the time of Montesquieu, it was by no means so generally recognized by the learned, as to have a sensible influence on the fashionable tone of thinking over Europe. The application of this fundamental and leading idea to the natural or *theoretical history* of society in all its various aspects:—to the history of languages, of the arts, of the sciences, of laws, of government, of manners, and of religion,—is the peculiar glory of the latter half of the eighteenth century; and forms a characteristic feature in its philosophy, which even the imagination of Bacon was unable to foresee.

It would be endless to particularize the original suggestions thrown out by Bacon on topics connected with the science of Mind. The few passages of this sort already quoted, are produced merely as a specimen of the rest. They are by no means selected as the most important in his writings; but, as they happened to be those which had left the strongest impression on my memory, I thought them as likely as any other, to invite the curiosity of my readers to a careful examination of the rich mine from which they are extracted.

The Ethical disquisitions of Bacon are almost entirely of a practical nature. Of the two theoretical questions, so much agitated, in both parts of this Island, during the eighteenth century, concerning the *principle* and the *object* of moral approbation, he has said nothing; but he has opened some new and interesting views with respect to the influence of *custom* and the formation of *habits*;—a most important article of moral philosophy, on which he has enlarged more ably and more usefully than any writer since Aristotle.¹ Under the same head of *Ethicks* may be mentioned the small volume to which he has given the title of *Essays*; the best known and the most popular of all his works. It is also one of those where the superiority of his genius appears to the greatest advantage; the novelty and depth of his reflections often receiving a strong relief from the triteness of his subject. It may be read from beginning to end in a few hours,—and yet, after the twentieth perusal, one seldom fails to remark in it something overlooked before. This, indeed, is a characteristick of all Bacon's writings, and is only to be accounted for by the inexhaustible aliment they furnish to our own thoughts, and the sympathetick activity they impart to our torpid faculties.

The suggestions of Bacon for the improvement of Political Philosophy, exhibit as strong a contrast to the narrow systems of contemporary statesmen, as the Inductive Logick to that of the Schools. How profound and comprehensive are the views opened in the following passages when compared with the scope of the celebrated treatise *De Jure Belli et Pacis*; a work which was first published about a year before Bacon's death, and which continued, for a hundred and fifty years afterwards, to be regarded

¹ *De Aug. Scient.* Lib. vii, cap. iii.

in all Protestant universities of Europe as an inexhaustible treasure of moral and jurisprudential wisdom !

“ The ultimate object which legislators ought to have in view, and to which all their enactments and sanctions, ought to be subservient, is, *that the citizens may live happily*. For this purpose, it is necessary that they should receive a religious and pious education ; that they should be trained to good morals ; that they should be secured from foreign enemies by proper military arrangements ; that they should be guarded by an effectual police against seditious and private injuries ; that they should be loyal to government, and obedient to magistrates ; and finally, that they should abound in wealth, and in other national resources.”¹—“ The science of such matters certainly belongs more particularly to the province of men who, by habits of publick business, have been led to take a comprehensive survey of the social order ; of the interests of the community at large ; of the rules of natural equity ; of the manners of nations ; of the different forms of government ; and who are thus prepared to reason concerning the wisdom of laws, both from considerations of justice and of policy. The great desideratum, accordingly, is, by investigating the principles of *natural justice*, and those of *political expediency*, to exhibit a theoretical model of legislation, which,

¹ *Exemplum Tractatus de Fontibus Juris*, Aphor. 5. This enumeration of the different objects of law approaches very nearly to Mr. Smith's ideas on the same subject, as expressed by himself in the concluding sentence of his *Theory of Moral Sentiments*. “ In another Discourse, I shall endeavour to give an account of the general principles of law and government, and of the different revolutions they have undergone in the different ages and periods of society ; not only in what concerns justice, but in what concerns police, revenue, and arms, and whatever else is the object of law.”

while it serves as a standard for estimating the comparative excellence of municipal codes, may suggest hints for their correction and improvement, to such as have at heart the welfare of mankind.”¹

How precise the notion was that Bacon had formed of a philosophical system of jurisprudence (with which, as a standard, the municipal laws of different nations might be compared,) appears from a remarkable expression, in which he mentions it as the proper business of those who might attempt to carry his plan into execution, to investigate those “*LEGES LEGUM, ex quibus informatio peti possit, quid in singulis legibus bene aut perperam positum aut constitutum sit.*”² I do not know if, in Bacon’s prophetick antici-

¹ *De Aug. Scient. Lib. viii, cap. iii.*

² *De Fontibus Juris, Aphor. 6.*

From the preface to a small tract of Bacon’s, entitled, *The Elements of the Common Laws of England*, (written while he was Solicitor General to Queen Elizabeth), we learn, that the phrase *legum leges* had been previously used by some “great Civilian.” To what *civilian* Bacon here alludes, I know not; but, whoever he was, I doubt much if he annexed to it the comprehensive and philosophical meaning, so precisely explained in the above definition. Bacon himself, when he wrote his Tract on the Common Laws, does not seem to have yet risen to this vantage-ground of Universal Jurisprudence. His great object (he tells us) was “to collect the rules and grounds dispersed throughout the body of the same laws, in order to see more profoundly into the reason of such judgments and ruled cases, and thereby to make more use of them for the decision of other cases more doubtful; so that the uncertainty of law, which is the principal and most just challenge that is made to the laws of our nation at this time, will, by this new strength laid to the foundation, be somewhat the more settled and corrected.” In this passage, no reference whatever is made to the *Universal Justice* spoken of in the aphorisms *de Fontibus Juris*; but merely to the leading and governing rules which give to a municipal system whatever it possesses of analogy and consistency. To these rules Bacon gives the title of *leges legum*; but the meaning of the phrase, on this occasion, differs from that in which he afterwards employed it, not less widely, than the rules of Latin or of Greek syntax differ from the principles of Universal Grammar.

pations of the future progress of physicks, there be any thing more characteristical, both of the grandeur and of the justness of his conceptions, than this short definition; more particularly, when we consider how widely Grotius, in a work professedly devoted to this very inquiry, was soon after to wander from the right path, in consequence of his vague and wavering idea of the aim of his researches.

The sagacity, however, displayed in these, and various other passages of a similar import, can by no means be duly appreciated, without attending, at the same time, to the cautious and temperate maxims so frequently inculcated by the author, on the subject of political innovation. "A stubborn retention of customs is a turbulent thing, not less than the introduction of new."—"Time is the greatest innovator; shall we then not imitate time, which innovates so silently as to mock the sense?" Nearly connected with these aphorisms, are the profound reflections in the first book *De Augmentis Scientiarum*, on the necessity of accommodating every new institution to the character and circumstances of the people for whom it is intended; and on the peculiar danger which literary men run, of overlooking this consideration, from the familiar acquaintance they acquire, in the course of their early studies, with the ideas and sentiments of the ancient classicks.

The remark of Bacon on the systematical policy of Henry VII, was manifestly suggested by the same train of thinking. "His laws (whoso marks them well) were deep and not vulgar; not made on the spur of a particular occasion for the present, but out of providence for the future; to make the estate of his people still more and more happy, after the manner of the legislators in ancient and heroic times." How far this noble eulogy was merited, either by the legislators of antiquity, or by the modern Prince on whom Bacon has bestowed it, is a question of little moment.

I quote it merely on account of the important philosophical distinction which it indirectly marks, between "deep and vulgar laws;" the former invariably aiming to accomplish their end, not by giving any sudden shock to the feelings and interests of the existing generation, but by allowing to natural causes time and opportunity to operate; and by removing those artificial obstacles which check the progressive tendencies of society. It is probable, that, on this occasion, Bacon had an eye more particularly to the memorable *statute of alienation*; to the effects of which (whatever were the motives of its author) the above description certainly applies in an eminent degree.

After all, however, it must be acknowledged, that it is rather in his general views and maxims, than in the details of his political theories, that Bacon's sagacity appears to advantage. His notions with respect to commercial policy seem to have been more peculiarly erroneous; originating in an overweening opinion of the efficacy of law, in matters where natural causes ought to be allowed a free operation. It is observed by Mr. Hume, that the statutes of Henry VII, relating to the police of his kingdom, are generally contrived with more judgment than his commercial regulations. The same writer adds, that "the more simple ideas of order and equity are sufficient to guide a legislator in every thing that regards the internal administration of justice; but that the principles of commerce are much more complicated, and require long experience and deep reflection to be well understood in any state. The real consequence is *there* often contrary to first appearances. No wonder, that, during the reign of Henry VII, these matters were frequently mistaken; and it may safely be affirmed, that, even in the age of Lord Bacon, very imperfect and erroneous ideas were formed on that subject."

The instances mentioned by Hume, in confirmation of these general remarks, are peculiarly gratifying to those who have a pleasure in tracing the slow but certain progress of reason and liberality. “During the reign,” says he, “of Henry VII, it was prohibited to export horses, as if that exportation did not encourage the breed, and make them more plentiful in the kingdom. Prices were also affixed to woollen cloths, to caps and hats, and the wages of labourers were regulated by law. IT IS EVIDENT, *that these matters ought always to be left free, and be entrusted to the common course of business and commerce.*”—“For a like reason,” the historian continues, “the law enacted against inclosures, and for the keeping up of farmhouses, scarcely deserves the praises bestowed on it by Lord Bacon. If husbandmen understand agriculture, and have a ready vent for their commodities, we need not dread a diminution of the people employed in the country. During a century and a half after this period, there was a frequent renewal of laws and edicts against depopulation; whence we may infer, that none of them were ever executed. *The natural course of improvement at last provided a remedy.*”

These acute and decisive strictures on the impolicy of some laws highly applauded by Bacon, while they strongly illustrate the narrow and mistaken views in political economy, entertained by the wisest statesmen and philosophers two centuries ago, afford, at the same time, a proof of the general diffusion which has since taken place among the people of Great Britain, of juster and more enlightened opinions on this important branch of legislation. Wherever such doctrines find their way into the page of history, it may be safely inferred, that the publick mind is not indisposed to give them a welcome reception.

The ideas of Bacon concerning the education of youth, were such as might be expected from a philosophical statesman. On the conduct of education in general, with a view to the development and improvement of the intellectual character, he has suggested various useful hints in different parts of his works ; but what I wish chiefly to remark at present is, the paramount importance which he has attached to the education of the people,—comparing (as he has repeatedly done) the effects of early culture on the understanding and the heart, to the abundant harvest which rewards the diligent husbandman for the toils of the spring. To this analogy he seems to have been particularly anxious to attract the attention of his readers, by bestowing on education the title of *the Georgicks of the Mind* ; identifying, by a happy and impressive metaphor, the two proudest functions entrusted to the legislator,—the encouragement of agricultural industry, and the care of national instruction. In both instances, the legislator exerts a power which is literally *productive* or *creative* ; compelling, in the one case, the unprofitable desert to pour forth its latent riches ; and in the other, vivifying the dormant seeds of genius and virtue, and redeeming from the neglected wastes of human intellect, a new and unexpected accession to the common inheritance of mankind.

When from such speculations as these, we descend to the treatise *De Jure Belli et Pacis*, the contrast is mortifying indeed. And yet, so much better suited were the talents and accomplishments of Grotius to the taste, not only of his contemporaries, but of their remote descendants, that, while the merits of Bacon failed, for a century and a half, to command the general admiration of Europe,¹ Grotius

¹ La célébrité en France des écrits du Chancelier Bacon n'a guere pour date que celle de l'Encyclopédie." (*Histoire des Ma-*

continued, even in our British universities, the acknowledged Oracle of Jurisprudence and of Ethics, till long after the death of Montesquieu. Nor was Bacon himself unapprized of the slow growth of his posthumous fame. No writer seems ever to have felt more deeply, that he properly belonged to a later and more enlightened age;—a sentiment which he has pathetically expressed in that clause of his testament, where he “bequeaths his name to posterity, after some generations shall be past.”¹

Unbounded, however, as the reputation of Grotius was on the Continent, even before his own death, it was not till many years after the publication of the treatise *De Jure Belli et Pacis*, that the science of natural jurisprudence became, in this Island, an object of much attention, even to the learned. In order, therefore, to give to the sequel of this section some degree of continuity, I shall reserve my observations on Grotius and his successors, till I shall have finished all that I think it necessary to mention further, with respect to the literature of our own country, prior to the appearance of Mr. Locke’s Essay.

The rapid advancement of intellectual cultivation in England, between the years 1588 and 1640 (a period of almost uninterrupted peace,) has been remarked by Mr. Fox. “The general improvement,” he observes, “in all arts of civil life, and above all, the astonishing progress of

thématiques par Montucla, Preface, p. ix.) It is an extraordinary circumstance, that Bayle, who has so often wasted his erudition and acuteness on the most insignificant characters, and to whom Le Clerc has very justly ascribed the merit of *une exactitude étonnante dans des choses de néant*, should have devoted to Bacon only twelve lines of his Dictionary.

¹ See Note F.

literature, are the most striking among the general features of that period ; and are in themselves causes sufficient to produce effects of the utmost importance. A country whose language was enriched by the works of Hooker, Raleigh, and Bacon, could not but experience a sensible change in its manners, and in its style of thinking ; and even to speak the same language in which Spenser and Shakspeare had written, seemed a sufficient plea to rescue the Commons of England from the appellation of *Brutes*, with which Henry the Eighth had addressed them.”—The remark is equally just and refined. It is by the mediation of an improving language, that the progress of the mind is chiefly continued from one generation to another ; and that the acquirements of the enlightened few are insensibly imparted to the many. Whatever tends to diminish the ambiguities of speech, or to fix, with more logical precision, the import of general terms ;—above all, whatever tends to embody, in popular forms of expression, the ideas and feelings of the wise and good, augments the natural powers of the human understanding, and enables the succeeding race to start from a higher ground than was occupied by their fathers. The remark applies with peculiar force to the study of the Mind itself ; a study, where the chief source of error is the imperfection of words ; and where every improvement on this great instrument of thought may be justly regarded in the light of a discovery.¹

¹ It is not so foreign as may at first be supposed to the object of this Discourse, to take notice here of the extraordinary demand for books on *Agriculture* under the government of James I. The fact is thus very strongly stated by Dr. Johnson, in his introduction to the Harleian Miscellany. “It deserves to be remarked, because it is not generally known, that the treatises on

In the foregoing list of illustrious names, Mr. Fox has, with much propriety, connected those of Bacon and Raleigh; two men, who, notwithstanding the diversity of their professional pursuits, and the strong contrast of their characters, exhibit, nevertheless, in their capacity of authors, some striking features of resemblance. Both of them owed to the force of their own minds, their emancipation from the fetters of the schools; both were eminently distinguished above their contemporaries, by the originality and enlargement of their philosophical views; and both divide, with the venerable Hooker, the glory of exemplifying to their yet unpolished countrymen, the richness, variety, and grace, which might be lent to the English idiom by the hand of a master.¹

It is not improbable that Mr. Fox might have included the name of Hobbes in the same enumeration, had he not been prevented by an aversion to his slavish principles of

husbandry and agriculture, which were published during the reign of King James, are so numerous, that it can scarcely be imagined by whom they were written, or to whom they were sold." Nothing can illustrate more strongly the effects of a pacifick system of policy, in encouraging a general taste for reading, as well as an active spirit of national improvement. At all times, and in every country, the extensive sale of *books on agriculture*, may be regarded as one of the most pleasing symptoms of mental cultivation in the great body of a people.

¹ To prevent being misunderstood, it is necessary for me to add, that I do not speak of the *general style* of these old authors; but only of detached passages, which may be selected from all of them, as earnest or first fruits of a new and brighter era in English literature. It may be safely affirmed, that in *their* works, and in the prose compositions of Milton, are to be found some of the finest sentences of which our language has yet to boast. To propose them *now* as models for imitation, would be quite absurd. Dr. Lowth certainly went much too far when he said, "That in *correctness, propriety, and purity* of English style, Hooker hath hardly been surpassed, or even equalled, by any of his successors." *Preface to Lowth's English Grammar.*

government, and by his general disrelish for metaphysical theories. As a writer, Hobbes unquestionably ranks high among the older English classicks; and is so peculiarly distinguished by the simplicity and ease of his manner, that one would naturally have expected from Mr. Fox's characteristic taste, that he would have relished *his* style still more than that of Bacon¹ or of Raleigh.—It is with the *philosophical* merits, however, of Hobbes, that we are alone concerned at present; and, in this point of view, what a space is filled in the subsequent history of our domestick literature, by his own works, and by those of his innumerable opponents! Little else, indeed, but the systems which he published, and the controversies which they provoked, occurs, during the interval between Bacon and Locke, to mark the progress of English Philosophy, either in the

¹ According to Dr. Burnet (no contemptible judge of style,) Bacon was “the first that *writ* our language correctly.” The same learned prelate pronounces Bacon to be “*still* our best author;” and *this*, at a time, when the works of Sprat, and many of the prose compositions of Cowley and of Dryden, were already in the hands of the publick. It is difficult to conceive on what grounds Burnet proceeded, in hazarding so extraordinary an opinion. See the preface to Burnet's translation of More's *Utopia*.

It is still more difficult, on the other hand, to account for the following very bold decision of Mr. Hume. I transcribe it from an essay first published in 1742; but the same passage is to be found in the last edition of his works, corrected by himself. “The first polite prose we have, was *writ* by a man (Dr. Swift) who is still alive. As to Sprat, Locke, and even Temple, they knew too little of the rules of art to be esteemed elegant writers. The prose of Bacon, Harrington, and Milton, is altogether stiff and pedantick; though their sense be excellent.”

How insignificant are the petty grammatical improvements proposed by Swift, when compared with the inexhaustible riches imparted to the English tongue by the writers of the seventeenth century; and how inferiour, in all the higher qualities and graces of style, are his prose compositions, to those of his immediate predecessors, Dryden, Pope, and Addison!

study of the Mind, or in the kindred researches of Ethical and Political Science.

Of the few and comparatively trifling exceptions to this remark, furnished by the metaphysical tracts of Glanville, of Henry More, and of John Smith, I must delay taking notice, till some account shall be given of the Cartesian philosophy; to which their most interesting discussions have a constant reference, either in the way of comment or refutation.

HOBBS.¹

“The philosopher of Malmesbury,” says Dr. Warburton, “was the terrour of the last age, as Tindall and Collins are of this. The press sweat with controversy; and every young churchman militant would try his arms in thundering on Hobbes’s steel cap.”² Nor was the opposition to Hobbes confined to the clerical order, or to the controversialists of his own times. The most eminent moralists and politicians of the eighteenth century may be ranked in the number of his antagonists, and even at the present moment, scarcely does there appear a new publication on Ethicks or Jurisprudence, where a refutation of Hobbism is not to be found.

The period when Hobbes began his literary career, as well as the principal incidents of his life, were, in a singular degree, favourable to a mind like his; impatient of the yoke of authority, and ambitious to attract attention, if not by solid and useful discoveries, at least by an ingenious defence of paradoxical tenets. After a residence of five years at Oxford, and a very extensive tour through France

¹ Born 1588, died 1679.

² *Divine Legation*, Pref. to vol. II, p. 9.

and Italy, he had the good fortune, upon his return to England, to be admitted into the intimacy and confidence of Lord Bacon; a circumstance which, we may presume, contributed not a little to encourage that bold spirit of inquiry, and that aversion to scholastick learning, which characterize his writings. Happy, if he had, at the same time, imbibed some portion of that love of truth and zeal for the advancement of knowledge, which seem to have been Bacon's ruling passions! But such was the obstinacy of his temper, and his overweening self-conceit, that, instead of co-operating with Bacon in the execution of his magnificent design, he resolved to rear, on a foundation exclusively his own, a complete structure both of Moral and Physical science; disdaining to avail himself even of the materials collected by his predecessors, and treating the *experimentarian* philosophers as objects only of contempt and ridicule!¹

In the *political* writings of Hobbes, we may perceive the influence also of other motives. From his earliest years, he seems to have been decidedly hostile to all the forms of popular government; and it is said to have been with the design of impressing his countrymen with a just sense of the disorders incident to democratical establishments, that he published, in 1618, an English translation of Thucydides. In these opinions he was more and more confirmed by the events he afterwards witnessed in England; the fatal consequences of which he early foresaw with so much alarm, that, in 1640, he withdrew from the approaching storm, to enjoy the society of his philosophical friends at Paris. It was here he wrote his book *De Cive*, a few copies of which were printed, and privately circulated in 1642. The same work was afterwards given to the publick, with material corrections and improvements,

¹ See Note G.

in 1647, when the author's attachment to the royal cause being strengthened by his personal connexion with the exiled King, he thought it incumbent on him to stand forth avowedly as an advocate for those principles which he had long professed. The great object of this performance was, to strengthen the hands of sovereigns against the rising spirit of democracy, by arming them with the weapons of a new philosophy.

The fundamental doctrines inculcated in the political works of Hobbes are contained in the following propositions. I recapitulate them here, not on their own account, but to prepare the way for some remarks which I mean afterwards to offer on the coincidence between the principles of Hobbes and those of Locke. In their practical conclusions, indeed, with respect to the rights and duties of citizens, the two writers differ widely; but it is curious to observe how very nearly they set out from the same hypothetical assumptions.

All men are by nature equal; and, prior to government, they had all an equal right to enjoy the good things of this world. Man, too, is (according to Hobbes) by nature a solitary and purely selfish animal; the social union being entirely an interested league, suggested by prudential views of personal advantage. The necessary consequence is, that a state of nature must be a state of perpetual warfare, in which no individual has any other means of safety than his own strength or ingenuity; and in which there is no room for regular industry, because no secure enjoyment of its fruits. In confirmation of this view of the origin of society, Hobbes appeals to facts falling daily within the circle of our own experience. "Does not a man, (he asks) when taking a journey, arm himself, and seek to go well accompanied? When going to sleep, does he not lock his doors? Nay, even in his own house, does he not lock his chests?

Does he not *there* as much accuse mankind by his actions, as I do by my words?"¹ An additional argument to the same purpose may, according to some later Hobbists, be derived from the instinctive aversion of infants for strangers; and from the apprehension which (it is alleged) every person feels, when he hears the tread of an unknown foot in the dark.

For the sake of peace and security, it is necessary that each individual should surrender a part of his natural right, and be contented with such a share of liberty as he is willing to allow to others; or, to use Hobbes's own language, "every man must divest himself of the right he has to all things by nature; the right of all men to all things being in effect no better than if no man had a right to any thing."² In consequence of this transference of natural rights to an individual, or to a body of individuals, the multitude become one person, under the name of a State or Republick, by which person the common will and power are exercised for the common defence. The ruling power cannot be withdrawn from those to whom it has been committed; nor can they be punished for misgovernment. The interpretation of the laws is to be sought, not from the comments of philosophers, but from the authority of the ruler; otherwise society would every moment be in danger of resolving itself into the discordant elements of which it was at first composed. The will of the magistrate, therefore, is to be regarded as the ultimate standard of right and wrong, and his voice to be listened to by every citizen as the voice of conscience.

Not many years afterwards,³ Hobbes pushed the argument for the absolute power of princes still further, in a

¹ *Of Man*, Part I, chap. xiii.

² *De Corpore Politico*, Part I, chap. i. § 10.

³ In 1651.

work to which he gave the name of *Leviathan*. Under this appellation he means the *body politic*; insinuating, that man is an untameable beast of prey, and that government is the strong chain by which he is kept from mischief. The fundamental principles here maintained are the same as in the book *De Cive*; but as it inveighs more particularly against *ecclesiastical* tyranny, with the view of subjecting the consciences of men to the civil authority, it lost the author the favour of some powerful protectors he had hitherto enjoyed among the English divines who attended Charles II, in France; and he even found it convenient to quit that kingdom, and to return to England, where Cromwell (to whose government his political tenets were *now* as favourable as they were meant to be to the royal claims) suffered him to remain unmolested. The same circumstances operated to his disadvantage after the Restoration, and obliged the King, who always retained for him a very strong attachment, to confer his marks of favour on him with the utmost reserve and circumspection.¹

The details which I have entered into, with respect to the History of Hobbes's political writings, will be found, by those who may peruse them, to throw much light on the author's reasonings. Indeed, it is only by thus considering them in their connexion with the circumstances of the times, and the fortunes of the writer, that a just notion can be formed of their spirit and tendency.

The ethical principles of Hobbes are so completely interwoven with his political system, that all which has been said of the one may be applied to the other. It is very remarkable, that Descartes should have thought so highly of the former, as to pronounce Hobbes to be "a

¹ See Note H.

much greater master of morality than of metaphysics ;” a judgment which is of itself sufficient to mark the very low state of ethical science in France about the middle of the seventeenth century. Mr. Addison, on the other hand, gives a decided preference (among all the books written by Hobbes) to his *Treatise on Human Nature* ; and to his opinion on this point I most implicitly subscribe ; including, however, in the same commendation, some of his other philosophical essays on similar topics. They are the only part of his works which it is possible now to read with any interest ; and they every where evince in their author, even when he thinks most unsoundly himself, that power of setting his reader a-thinking, which is one of the most unequivocal marks of original genius. They have plainly been studied with the utmost care, both by Locke and Hume. To the former they have suggested some of his most important observations on the Association of Ideas, as well as much of the sophistry displayed in the first book of his Essay, on the Origin of our Knowledge, and on the factitious nature of our moral principles ; to the latter (among a variety of hints of less consequence,) his theory concerning the nature of those established connexions among physical events, which it is the business of the natural philosopher to ascertain, ¹ and the substance of

¹ The same doctrine, concerning the proper object of natural philosophy (commonly ascribed to Mr. Hume, both by his followers and by his opponents,) is to be found in various writers contemporary with Hobbes. It is stated, with uncommon precision and clearness, in a book entitled *Scepsis Scientifica*, or Confessed Ignorance the way to Science ; by Joseph Glanvill, (printed in 1665.) The whole work is strongly marked with the features of an acute, an original, and (in matters of science) a somewhat skeptical genius ; and, when compared with the treatise on witchcraft, by the same author, adds another proof to those already mentioned, of the possible union of the highest intellectual gifts with the most degrading intellectual weaknesses.

his argument against the scholastick doctrine of general conceptions. It is from the works of Hobbes, too, that our later Necessitarians have borrowed the most formidable of those weapons with which they have combated the doctrine of moral liberty; and from the same source has been derived the leading idea which runs through the philological materialism of Mr. Horne Tooke. It is probable, indeed, that this last author borrowed it, at second-hand, from a hint in Locke's Essay; but it is repeatedly stated by Hobbes, in the most explicit and confident terms. Of this idea, (than which, in point of fact, nothing can be imagined more puerile and unsound,) Mr. Tooke's etymologies, when he applies them to the solution of metaphysical questions, are little more than an ingenious expansion, adapted and levelled to the comprehension of the multitude.

The speculations of Hobbes, however, concerning the theory of the understanding, do not seem to have been nearly so much attended to during his own life, as some of his other doctrines, which, having a more immediate reference to human affairs, were better adapted to the unsettled and revolutionary spirit of the times. It is by these doctrines, chiefly, that his name has since become so memorable in the annals of modern literature; and although they now derive their whole interest from the extraordinary combination they exhibit of acuteness and subtilty with a dead-palsy in the powers of taste and of moral sensibility, yet they will be found, on an attentive examination, to have had a far more extensive influence on

With respect to the *Scepsis Scientifica*, it deserves to be noticed, that the doctrine maintained in it concerning *physical* causes and effects does not occur in the form of a detached observation, of the value of which the author might not have been fully aware, but is the very basis of the general argument running through all his discussions.

the subsequent history both of political and of ethical science, than any other publication of the same period.

ANTAGONISTS OF HOBBS.

Cudworth¹ was one of the first who successfully combated this new philosophy. As Hobbes, in the frenzy of his political zeal, had been led to sacrifice wantonly all the principles of religion and morality to the establishment of his conclusions, his works not only gave offence to the friends of liberty, but excited a general alarm among all sound moralists. His doctrine, in particular, that there is no *natural* distinction between Right and Wrong, and that these are dependent on the arbitrary will of the civil magistrate, was so obviously subversive of all the commonly received ideas concerning the moral constitution of human nature, that it became indispensably necessary, either to expose the sophistry of the attempt, or to admit, with Hobbes, that man is a beast of prey, incapable of being governed by any motives but fear, and the desire of self-preservation.

Between some of these tenets of the courtly Hobbists, and those inculcated by the Cromwellian Antinomians, there was a very extraordinary and unfortunate coincidence; the latter insisting, that, in expectation of Christ's second coming, "the obligations of morality and natural law were suspended; and that the elect, guided by an internal principle, more perfect and divine, were superiour to the *beggarly elements* of justice and humanity."² It was the object of Cudworth to vindicate, against the assaults of both parties, the immutability of moral distinctions.

¹ Born 1617, died 1688.

² Hume.—For a more particular account of the English Antinomians, see Mosheim, vol. IV, p. 534, *et seq.*

In the prosecution of his very able argument on this subject, Cudworth displays a rich store of enlightened and choice erudition, penetrated throughout with a peculiar vein of sobered and subdued Platonism, from whence some German systems, which have attracted no small notice in our own times, will be found, when stripped of their deep neological disguise, to have borrowed their most valuable materials.¹

Another coincidence between the Hobbists and the Antinomians, may be remarked in their common zeal for the

¹ The mind (according to Cudworth) perceives, by occasion of outward objects, as much more than is presented to it by sense, as a learned man does in the best written book, than an illiterate person or brute. "To the eyes of both, the same characters will appear; but the learned man, in those characters, will see heaven, earth, sun, and stars; reap profound theorems of philosophy or geometry; learn a great deal of new knowledge from them, and admire the wisdom of the composer; while, to the other, nothing appears but black strokes drawn on white paper. The reason of which is, that the mind of the one is furnished with certain previous inward anticipations, ideas, and instruction, that the other wants."—"In the room of this book of *human* composition, let us now substitute the book of Nature, written all over with the characters and impressions of *divine* wisdom and goodness, but legible only to an intellectual eye. To the sense, both of man and brute, there appears nothing else in it, but, as in the other, so many inky scrawls; that is, nothing but figures and colours. But the mind, which hath a participation of the divine wisdom that made it, upon occasion of those sensible delineations, exerting its own inward activity, will have not only a wonderful scene, and large prospects of other thoughts laid open before it, and variety of knowledge, logical, mathematical, and moral displayed; but also clearly read the divine wisdom and goodness in every page of this great volume, as it were written in large and legible characters."

I do not pretend to be an adept in the philosophy of Kant; but I certainly think I pay it a very high compliment, when I suppose, that, in the *Critick of pure Reason*, the leading idea is somewhat analogous to what is so much better expressed in the foregoing passage. To Kant it was probably suggested by the following very acute and decisive remark of Leibnitz on

scheme of *necessity*; which both of them stated in such a way as to be equally inconsistent with the moral agency of man, and with the moral attributes of God.' The strongest of all presumptions against this scheme is afforded by the other tenets with which it is almost universally combined; and, accordingly, it was very shrewdly observed by Cudworth, that *the licentious system* which flourished in his time (under which title, I presume, he comprehended the immoral tenets of the fanaticks, as well as of the Hobbists,) "grew up from the doctrine of the fatal necessity of all actions and events, as from its proper root." The unsettled, and, at the same time, disputatious period, during which Cudworth lived, afforded him peculiarly favourable opportunities of judging from experience, of the practical tendency of this metaphysical dogma; and the result of his observations

Locke's Essay: "*Nempe, nihil est in intellectu, quod non fuerit in sensu, nisi ipse intellectus.*"

In justice to Aristotle, it may be here observed, that, although the general strain of his language is strictly conformable to the scholastick maxim just quoted, he does not seem to have altogether overlooked the important exception to it pointed out by Leibnitz. Indeed, this exception or limitation is very nearly a translation of Aristotle's words. *Και αυτος δε νους νοητος εστιν, ωσπερ τα νοητα. επι μιν γαρ των ανευ υλης, το αυτο εστι το νοουν και το νοουμενον.* "And the mind itself is an object of knowledge, as well as other things which are intelligible. For, in immaterial beings, that which understands is the same with that which is understood." (*De Anima*, Lib. iii, cap. v.) I quote this very curious, and, I suspect, very little known sentence, in order to vindicate Aristotle against the misrepresentations of some of his present idolaters, who, in their anxiety to secure to him all the credit of Locke's doctrine concerning the Origin of our Ideas, have overlooked the occasional traces which occur in his works, of that higher and sounder philosophy in which he had been educated.

¹ "The doctrines of fate or destiny were deemed by the Independents essential to all religion. In these rigid opinions, *the whole sectaries*, amidst all their other differences, unanimously concurred." Hume's *History*, chap. lvii.

deserves the serious attention of those who may be disposed to regard it in the light of a fair and harmless theme for the display of controversial subtilty. To argue, in this manner, against a speculative principle from its palpable effects, is not always so illogical as some authors have supposed. "You repeat to me incessantly," says Rousseau to one of his correspondents, "that truth can never be injurious to the world. I myself believe so as firmly as you do ; and it is for this very reason I am satisfied that your proposition is false."¹

But the principal importance of Cudworth, as an ethical writer, arises from the influence of his argument concerning the immutability of right and wrong on the various theories of morals which appeared in the course of the eighteenth century. To this argument may, more particularly, be traced the origin of the celebrated question, Whether the principle of moral approbation is to be ultimately resolved into Reason, or into Sentiment?—a question, which has furnished the chief ground of difference between the systems of Cudworth and of Clarke, on the one hand ; and those of Shaftesbury, Hutcheson, Hume, and Smith, on the other. The remarks which I have to offer on this controversy must evidently be delayed, till the writings of these more modern authors shall fall under review.

The *Intellectual System* of Cudworth, embraces a field much wider than his treatise of *Immutable Morality*. The latter is particularly directed against the ethical doctrines of Hobbes, and of the Antinomians ; but the former aspires to tear up by the roots all the principles, both physical and metaphysical, of the Epicurean philosophy.

¹ " Vous répétez sans cesse que la vérité ne peut jamais faire de mal aux hommes ; je le crois. et c'est pour moi la preuve que ce que vous dites n'est pas la vérité."

It is a work, certainly, which reflects much honour on the talents of the author, and still more on the boundless extent of his learning; but it is so ill suited to the taste of the present age, that, since the time of Mr. Harris and Dr. Price, I scarcely recollect the slightest reference to it in the writings of our British metaphysicians. Of its faults (beside the general disposition of the author to discuss questions placed altogether beyond the reach of our faculties,) the most prominent is the wild hypothesis of a *plastick nature*; or, in other words, “of a vital and spiritual, but unintelligent and necessary agent, created by the Deity for the execution of his purposes.” Notwithstanding, however, these, and many other abatements of its merits, *the Intellectual System* will for ever remain a precious mine of information to those whose curiosity may lead them to study the spirit of the ancient theories; and to it we may justly apply what Leibnitz has somewhere said, with far less reason, of the works of the schoolmen, “*Scholasticos agnosco abundare ineptiis; sed aurum est in illo coeno.*”¹

Before dismissing the doctrines of Hobbes, it may be worth while to remark, that all his leading principles are traced by Cudworth to the remains of the ancient skepticks, by some of whom, as well as by Hobbes, they seem to have been adopted from a wish to flatter the uncontrollable passions of sovereigns. Not that I am disposed to call in question the originality of Hobbes; for it appears, from the testimony of all his friends, that he had much less pleasure in reading than in thinking. “If I had read,” he was accustomed to say, “as much as some others, I should have been as ignorant as they are.” But similar

¹ The *Intellectual System* was published in 1678. The *Treatise concerning Eternal and Immutable Morality* did not appear till a considerable number of years after the author's death.

political circumstances invariably reproduce similar philosophical theories; and it is one of the numerous disadvantages attending an inventive mind, not properly furnished with acquired information, to be continually liable to a waste of its powers on subjects previously exhausted.

The sudden tide of licentiousness, both in principles and in practice, which burst into this island at the moment of the Restoration, conspired with the paradoxes of Hobbes, and with the no less dangerous errors recently propagated among the people by their religious instructors, to turn the thoughts of sober and speculative men towards ethical disquisitions. The established clergy assumed a higher tone than before in their sermons; sometimes employing them in combating that Epicurean and Machiavelian philosophy which was then fashionable at court, and which may be always suspected to form the secret creed of the enemies of civil and religious liberty;—on other occasions, to overwhelm, with the united force of argument and learning, the extravagancies by which the ignorant enthusiasts of the preceding period had exposed Christianity itself to the scoffs of their libertine opponents. Among the divines who appeared at this era, it is impossible to pass over in silence the name of Barrow, whose theological works (adorned throughout by classical erudition, and by a vigorous, though unpolished eloquence,) exhibit, in every page, marks of the same inventive genius, which, in mathematicks, has secured to him a rank second alone to that of Newton. As a writer, he is equally distinguished by the redundancy of his matter, and by the pregnant brevity of his expression; but what more peculiarly characterizes his manner, is a certain air of powerful and of conscious facility in the execution of whatever he undertakes.—Whether the subject be mathematical, metaphysical, or

theological, he seems always to bring to it a mind which feels itself superiour to the occasion ; and which, in contending with the greatest difficulties, “ puts forth but half its strength.” He has somewhere spoken of his *Lectiones Mathematicae* (which it may, in passing, be remarked, display *metaphysical* talents of the highest order,) as extemporaneous effusions of his pen ; and I have no doubt that the same epithet is still more literally applicable to his pulpit discourses. It is, indeed, only thus we can account for the variety and extent of his voluminous remains, when we recollect that the author died at the age of forty-six. ¹

To the extreme rapidity with which Barrow committed his thoughts to writing, I am inclined to ascribe the hasty and not altogether consistent opinions which he has hazarded on some important topicks. I shall confine myself to a single example, which I select in preference to others, as it bears directly on the most interesting of all questions connected with the theory of morals. “ If we scan,” says he, “ the particular nature, and search into the original causes of the several kinds of naughty dispositions in our souls, and of miscarriages in our lives, we shall find inordinate self-love to be a main ingredient, and a common source of them all ; so that a divine of great name had

¹ In a note annexed to an English translation of the Cardinal Maury's *Principles of Eloquence*, it is stated, upon the authority of a manuscript of Dr. Doddridge, that *most* of Barrow's sermons were transcribed three times, and some much oftener. They seem to me to contain very strong intrinsick evidence of the incorrectness of this anecdote.—Mr. Abraham Hill, (in his *Account of the Life of Barrow*, addressed to Dr. Tillotson,) contents himself with saying, that “ *Some* of his sermons were written four or five times over ; ”—mentioning, at the same time, a circumstance which may account for this fact, in perfect consistency with what I have stated above,—that “ Barrow was very ready to *lend* his sermons as often as desired.”

some reason to affirm,—that *original sin* (or that innate distemper from which men generally become so very prone to evil, and averse to good,) doth consist in self-love, disposing us to all kinds of irregularity and excess.” In another passage, the same author expresses himself thus: “Reason dictateth and prescribeth to us, that we should have a sober regard to our true good and welfare; to our best interests and solid content; to that which (all things being rightly stated, considered and computed) will, in the final event, prove most beneficial and satisfactory to us: a self-love working in prosecution of such things, common sense cannot but allow and approve.”

Of these two opposite and irreconcilable opinions, the latter is incomparably the least wide of the truth; and accordingly Mr. Locke, and his innumerable followers, both in England and on the Continent, have maintained, that virtue and an enlightened self-love are one and the same. I shall afterwards find a more convenient opportunity for stating some objections to the latter doctrine, as well as to the former. I have quoted the two passages here, merely to show the very little attention that had been paid, at the era in question, to ethical science, by one of the most learned and profound divines of his age. This is the more remarkable, as his works every where inculcate the purest lessons of practical morality, and evince a singular acuteness and justness of eye in the observation of human character. Whoever compares the views of Barrow, when he touches on the theory of morals, with those opened about fifty years afterwards by Dr. Butler, in his *Discourses on Human Nature*, will be abundantly satisfied, that, in this science, as well as in others, the progress of the philosophical spirit during the intervening period was not inconsiderable.

The name of Wilkins, (although he too wrote with some reputation against the Epicureans of his day,) is now remembered chiefly in consequence of his treatises concerning *a universal language and a real character*. Of these treatises, I shall hereafter have occasion to take some notice, under a different article. With all the ingenuity displayed in them, they cannot be considered as accessions of much value to science; and the long period since elapsed, during which no attempt has been made to turn them to any practical use, affords of itself no slight presumption against the solidity of the project.

A few years before the death of Hobbes, Dr. Cumberland (afterwards Bishop of Peterborough) published a book, entitled, *De Legibus Naturae, Disquisitio Philosophica*; the principal aim of which was to confirm and illustrate, in opposition to Hobbes, the conclusions of Grotius, concerning *Natural Law*. The work is executed with ability, and discovers juster views of the object of moral science, than any modern system that had yet appeared; the author resting the strength of his argument, not, as Grotius had done, on an accumulation of authorities, but on the principles of the human frame, and the mutual relations of the human race. The circumstance, however, which chiefly entitles this publication to *our* notice is, that it seems to have been the earliest on the subject which attracted, in any considerable degree, the attention of English scholars. From this time, the writings of Grotius and Puffendorff began to be generally studied, and soon after made their way into the Universities. In Scotland, the impression produced by them was more peculiarly remarkable. They were every where adopted as the best manuals of ethical and of political instruction that could be put into the hands of students; and gradually contributed to form that memorable school, from whence

so many philosophers and Philosophical Historians were afterwards to proceed.

From the writings of Hobbes to those of Locke, the transition is easy and obvious; but, before prosecuting farther the history of philosophy in England, it will be proper to turn our attention to its progress abroad, since the period at which this section commences.¹ In the first

¹ Through the whole of this Discourse, I have avoided touching on the discussions which, on various occasions, have arisen with regard to the theory of government, and the comparative advantages or disadvantages of different political forms. Of the scope and spirit of these discussions it would be seldom possible to convey a just idea, without entering into details of a local or temporary nature, inconsistent with my general design. In the present circumstances of the world, besides, the theory of government (although, in one point of view, the most important of all studies) seems to possess a very subordinate interest to inquiries connected with political economy, and with the fundamental principles of legislation. What is it, indeed, that renders one form of government more favourable than another to human happiness, but the superiour security it provides for the enactment of wise laws, and for their impartial and vigorous execution? These considerations will sufficiently account for my passing over in silence, not only the names of Needham, of Sidney, and of Milton, but that of Harrington, whose *Oceana* is justly regarded as one of the boasts of English literature, and is pronounced by Hume to be “the only valuable model of a commonwealth that has yet been offered to the publick.” (*Essays and Treatises*, vol. I, Essay xvi.)

A remark which Hume has elsewhere made on the *Oceana*, appears to me so striking and so instructive, that I shall give it a place in this note. “Harrington,” he observes, “thought himself so sure of his general principle, *that the balance of power depends on that of property*, that he ventured to pronounce it impossible ever to reestablish monarchy in England: but his book was scarcely published when the King was restored; and we see that monarchy has ever since subsisted on the same footing as before. So dangerous is it for a politician to venture to foretell the situation of publick affairs a few years hence.” *Ibid.* Essay vii.

How much nearer the truth (even in the science of *politicks*) is Bacon’s cardinal principle, that *knowledge is power*!—a principle, which applies to Man not less in his corporate than in his

place, however, I shall add a few miscellaneous remarks on some important events which occurred in this country during the lifetime of Hobbes, and of which his extraordinary longevity prevented me sooner from taking notice.

Among these events, that which is most immediately connected with our present subject, is the establishment of the Royal Society of London in 1662, which was followed a few years afterwards by that of the Royal Academy of Sciences at Paris. The professed object of both institutions was the improvement of Experimental Knowledge, and of the auxiliary science of Mathematicks; but their influence on the general progress of human reason has been far greater than could possibly have been foreseen at the moment of their foundation. On the happy effects resulting from them in this respect, La Place has introduced some just reflections in his *System of the World*, which, as they discover more originality of thought than he commonly displays, when he ventures to step beyond the circumference of his own magick circle, I shall quote, in a literal translation of his words.

“The chief advantage of learned societies, is the *philosophical spirit* to which they may be expected to give birth, and which they cannot fail to diffuse over all the various pursuits of the nations among whom they are established. The insulated scholar may without dread abandon himself to the spirit of system; he hears the voice of contradiction only from afar. But in a learned society, the collision of systematick opinions soon terminates in their common destruction; while the desire of mutual conviction creates among the members a tacit compact, to

individual capacity; and which may be safely trusted to as the most solid of all foundations for our reasonings concerning the future history of the world.

admit nothing but the results of observation, or the conclusions of mathematical reasoning. Accordingly, experience has shewn, how much these establishments have contributed, since their origin, to the spread of true philosophy. By setting the example of submitting every thing to the examination of a severe logick, they have dissipated the prejudices which had too long reigned in the sciences; and which the strongest minds of the preceding centuries had not been able to resist. They have constantly opposed to empiricism a mass of knowledge, against which the errors adopted by the vulgar, with an enthusiasm which, in former times, would have perpetuated their empire, have spent their force in vain. In a word, it has been in their bosoms, that those grand theories have been conceived, which, although far exalted by their generality above the reach of the multitude, are for this very reason entitled to special encouragement, from their innumerable applications to the phenomena of nature, and to the practice of the arts.”¹

In confirmation of these judicious remarks, it may be farther observed, that nothing could have been more happily imagined, than the establishment of learned corporations for correcting those prejudices which (under the significant title of *Idola Specus*,) Bacon has described as incident to the retired student. While these *idols of the den* maintain their authority, the cultivation of the philosophical spirit is impossible; or rather, it is in a renunciation of this ido-

¹ The Royal Society of London, though not incorporated by charter till 1662, may be considered as virtually existing, at least as far back as 1638, when some of the most eminent of the original members began first to hold regular meetings at Gresham College, for the purpose of philosophical discussion. Even these meetings were but a continuation of those previously held by the same individuals at the apartments of Dr. Wilkins in Oxford. See Sprat's *History of the Royal Society*.

latry that the philosophical spirit essentially consists. It was accordingly in this great school of the learned world, that the characters of Bacon, Descartes, Leibnitz, and Locke were formed; the four individuals who have contributed the most to diffuse the philosophical spirit over Europe. The remark applies more peculiarly to Bacon, who first pointed out the inconveniences to be apprehended from a minute and mechanical subdivision of literary labour; and anticipated the advantages to be expected from the institution of learned academies, in enlarging the field of scientific curiosity, and the correspondent grasp of the emancipated mind. For accomplishing this object, what means so effectual as habits of daily intercourse with men whose pursuits are different from our own; and that expanded knowledge, both of man and of nature, of which such an intercourse must necessarily be productive!

Another event which operated still more forcibly and universally on the intellectual character of our countrymen, was the civil war which began in 1640, and which ultimately terminated in the usurpation of Cromwell. It is observed by Mr. Hume, that “the prevalence of democratical principles, under the Commonwealth, engaged the country gentlemen to bind their sons apprentices to merchants; and that commerce has ever since been more honourable in England, than in any other European kingdom.”¹ “The higher and the lower ranks (as a later writer has remarked) were thus brought closer together, and all of them inspired with an activity and vigour that, in former ages, had no example.”²

To this combination of the pursuits of trade with the advantages of a liberal education may be ascribed the great

¹ *History of England*, chap. lxii.

² Chalmers's *Political Estimate*, &c. (London 1804.) p. 44.

multitude of ingenious and enlightened speculations on commerce, and on the other branches of national industry, which issued from the press, in the short interval between the Restoration and the Revolution; an interval during which the sudden and immense extension of the trade of England, and the corresponding rise of the commercial interest, must have presented a spectacle peculiarly calculated to awaken the curiosity of inquisitive observers. It is a very remarkable circumstance with respect to these economical researches, which now engage so much of the attention both of statesmen and of philosophers, that they are altogether of modern origin. "There is scarcely," says Mr. Hume, "any ancient writer on politicks who has made mention of trade; nor was it ever considered as an affair of state till the seventeenth century." '-----The work of the celebrated John de Witt, entitled, "The true interest and political maxims of the republick of Holland and West Friesland," is the earliest publication of any note, in which commerce is treated of as an object of *national* and *political* concern, in opposition to the partial interests of corporations and of monopolists.

Of the English publications to which I have just alluded, the greater part consists of anonymous pamphlets, now only to be met with in the collections of the curious. A few bear the names of eminent English merchants. I shall have occasion to refer to them more particularly afterwards, when I come to speak of the writings of Smith, Quesnay, and Turgot. At present, I shall only observe, that, in these fugitive and now neglected tracts, are to be found the first rudiments of that science of *Political Economy* which is justly considered as the boast of the present age; and which, although the aid of learning and philosophy was necessary to rear it to maturity, may be justly said to have had its cradle in the Royal Exchange of London.

¹ *Essay on Civil Liberty.*

Mr. Locke was one of the first retired theorists (and this singular feature in his history has not been sufficiently attended to by his biographers,) who condescended to treat of *trade* as an object of liberal study. Notwithstanding the manifold errors into which he fell in the course of his reasonings concerning it, it may be fairly questioned, if he has any where else given greater proofs, either of the vigour or of the originality of his genius. But the name of Locke reminds me, that it is now time to interrupt these national details; and to turn our attention to the progress of science on the Continent, since the times of Bodinus and of Campanella.

SECTION II.

Progress of Philosophy in France during the Seventeenth Century.

MONTAIGNE—CHARRON—LA ROCHEFOUCAULD.

AT the head of the French writers who contributed, in the beginning of the seventeenth century, to turn the thoughts of their countrymen to subjects connected with the Philosophy of Mind, Montaigne may, I apprehend, be justly placed. Properly speaking, he belongs to a period somewhat earlier; but his tone of thinking and of writing classes him much more naturally with his successors, than with any French author who had appeared before him.¹

In assigning to Montaigne so distinguished a rank in the history of modern philosophy, I need scarcely say, that I leave entirely out of the account what constitutes (and justly constitutes) to the generality of readers the principal charm of his *Essays*; the good nature, humanity, and unaffected sensibility, which so irresistably attach us to his character,—lending, it must be owned, but too often, a

¹ Montaigne was born in 1533, and died in 1592.

fascination to his *talk*, when he cannot be recommended as the safest of companions. Nor do I lay much stress on the inviting frankness and vivacity with which he unbosoms himself about all his domestick habits and concerns ; and which render his book so expressive a portrait, not only of the author, but of the Gascon country gentleman, two hundred years ago. I have in view chiefly the minuteness and good faith of his details concerning his own personal qualities, both intellectual and moral. The only study which seems ever to have engaged his attention was that of *man* ; and for this he was singularly fitted, by a rare combination of that talent for observation which belongs to men of the world, with those habits of abstracted reflection, which men of the world have commonly so little disposition to cultivate. “I study myself,” says he, “more than any other subject. This is my metaphysick ; this my natural philosophy.”¹ He has accordingly produced a work, *unique* in its kind ; valuable, in an eminent degree, as an authentick record of many interesting facts relative to human nature ; but more valuable by far, as holding up a mirror in which every individual, if he does not see his own image, will at least occasionally perceive so many traits of resemblance to it, as can scarcely fail to invite his curiosity to a more careful review of himself. In this respect, Montaigne’s writings may be regarded in the light of what painters call *studies* ; in other words, of those slight sketches which were originally designed for the improvement or amusement of the artist ; but which, on that account, are the more likely to be useful in developing the germs of similar endowments in others.

Without a union of these two powers (reflection and observation,) the study of Man can never be successfully

¹ *Essays*, Book iii, chap. xiii.

prosecuted. It is only by retiring within ourselves that we can obtain a key to the characters of others; and it is only by observing and comparing the characters of others, that we can thoroughly understand and appreciate our own.

After all, however, it may be fairly questioned, notwithstanding the scrupulous fidelity with which Montaigne has endeavoured to delineate his own portrait, if he has been always sufficiently aware of the secret folds and reduplications of the human heart. That he was by no means exempted from the common delusions of self-love and self-deceit, has been fully evinced in a very acute, though somewhat uncharitable, section of the *Port Royal* logick; but this consideration, so far from diminishing the value of his Essays, is one of the most instructive lessons they afford to those who, after the example of the author, may undertake the salutary but humiliating task of self-examination.

As Montaigne's scientific knowledge was, according to his own account, "very vague and imperfect;"¹ and his book learning rather sententious and gossipping, than comprehensive and systematical, it would be unreasonable to expect, in his philosophical arguments, much either of depth or of solidity.² The sentiments he hazards are to be regarded but as the impressions of the moment; consisting chiefly of the more obvious doubts and difficulties

¹ Book i, chap. xxv.

² Montaigne's education, however, had not been neglected by his father. On the contrary, he tells us himself, that "George Buchanan, the great poet of Scotland, and Marcus Antonius Muretus, the best orator of his time, were among the number of his domestick preceptors."—"Buchanan," he adds, "when I saw him afterwards in the retinue of the late Mareschal de Brissac, told me, that he was about to write a treatise on the education of children, and that he would take the model of it from mine." Book i, chap. xxv.

which, on all metaphysical and moral questions, are apt to present themselves to a speculative mind, when it first attempts to dig below the surface of common opinions. In reading Montaigne, accordingly, what chiefly strikes us, is not the novelty, or the refinement of his ideas, but the liveliness and felicity with which we see embodied in words the previous wanderings of our own imaginations. It is probably owing to this circumstance, rather than to any direct plagiarism, that his Essays appear to contain the germs of so many of the paradoxical theories which, in later times, Helvetius and others have laboured to systematise and to support with the parade of Metaphysical discussion. In the mind of Montaigne, the same paradoxes may be easily traced to those deceitful *appearances* which, in order to stimulate our faculties to their best exertions, nature seems purposely to have thrown in our way, as stumbling blocks in the pursuit of truth; and it is only to be regretted on such occasions, for the sake of his own happiness, that his genius and temper qualified and disposed him more to start the problem than to investigate the solution.

When Montaigne touches on religion, he is, in general, less pleasing than on other subjects. His constitutional temper, it is probable, predisposed him to skepticism; but this original bias could not fail to be mightily strengthened by the disputes, both religious and political, which, during his lifetime, convulsed Europe, and more particularly his own country. On a mind like his it may be safely presumed, that the writings of the reformers, and the instructions of Buchanan, were not altogether without effect; and hence, in all probability, the perpetual struggle, which he is at no pains to conceal, between the creed of his infancy, and the lights of his mature understanding. He speaks, indeed, of “reposing tranquilly on the *pillow of doubt* ;” but this

language is neither reconcilable with the general complexion of his works, nor with the most authentick accounts we have received of his dying moments. It is a maxim of his own, that, “in forming a judgment of a man’s life, particular regard should be paid to his behaviour at the end of it;” to which he pathetically adds, “that the chief study of his own life was, that his latter end might be decent, calm, and silent.” The fact is (if we may credit the testimony of his biographers,) that, in his declining years, he exchanged his boasted *pillow of doubt* for the more powerful opiates prescribed by the infallible church; and that he expired in performing, what his old preceptor Buchanan would not have scrupled to describe as an act of idolatry.¹

The skepticism of Montaigne seems to have been of a very peculiar cast, and to have had little in common with that either of Bayle or of Hume. The great aim of the two latter writers evidently was, by exposing the uncertainty of our reasonings whenever we pass the limit of sensible objects, to inspire their readers with a complete distrust of the human faculties on all moral and metaphysical topicks. Montaigne, on the other hand, never thinks of forming a sect; but, yielding passively to the current of his reflections and feelings, argues, at different times, according to the varying state of his impressions and temper, on opposite sides of the same question. On all occasions, he preserves an air of the most perfect sincerity; and it was to *this*, I presume, much more than to the superiority of his reasoning powers, that Montesquieu alluded, when he said, “In the greater part of authors I see the *writer*; in Mon-

¹ “Sentant sa fin approcher, il fit dire la messe dans sa chambre. A l’élévation de l’hostie, il se leva sur son lit pour l’adorer; mais une foiblesse l’enleva dans ce moment même, le 15 Septembre 1592. à 60 ans.” *Nouveau Dict. Histor.* à Lyon, 1804. Art. Montaigne.

taigne I see nothing but the *thinker*.” The radical fault of his understanding consisted in an incapacity of forming, on disputable points, those decided and fixed opinions which can alone impart either force or consistency to intellectual character. For remedying this weakness, the religious controversies, and the civil wars recently engendered by the Reformation, were but ill calculated. The minds of the most serious men, all over Christendom, must have been then unsettled in an extraordinary degree ; and where any predisposition to skepticism existed, every external circumstance must have conspired to cherish and confirm it. Of the extent to which it was carried, about the same period, in England, some judgment may be formed from the following description of a *Skeptick*, by a writer not many years posterior to Montaigne.

“ A skeptick in religion is one that hangs in the balance with all sorts of opinions ; whereof not one but stirs him, and none sways him. A man guiltier of credulity than he is taken to be ; for it is out of his belief of every thing that he believes nothing. Each religion scares him from its contrary, none persuades him to itself. He would be wholly a Christian, but that he is something of an Atheist ; and wholly an Atheist, but that he is partly a Christian ; and a perfect Heretick, but that there are so many to distract him. He finds *reason* in all opinions, *truth* in none ; indeed, the least reason perplexes him, and the best will not satisfy him. He finds doubts and scruples better than resolves them, and *is always too hard for himself*.”¹ If this portrait had been presented to Montaigne, I have little doubt that he

¹ *Micro-cosmography*, or a Piece of the World Discovered, in Essays and Characters. For a short notice of the author of this very curious book (Bishop Earle,) see *Letters from the Bodleian Library*, vol. I, p. 141. I understand it has been lately reprinted in London, but have only seen one of the old editions (the seventh,) printed in 1638. The chapter from which I have transcribed the above passage is entitled *A skeptick in Religion* ; and

would have had the candour to acknowledge, that he recognized in it some of the most prominent and characteristical features of his own mind.¹

The most elaborate, and seemingly the most serious, of all Montaigne's essays, is his long and somewhat tedious *Apology for Raimond de Sebonde*, contained in the twelfth chapter of his second book. This author appears, from Montaigne's account, to have been a Spaniard, who professed physick at Thoulouse, towards the end of the fourteenth century; and who published a treatise, entitled *Theologia Naturalis*, which was put into the hands of Montaigne's father by a friend, as a useful antidote against the innovations with which Luther was then beginning to disturb the ancient faith. That, in this particular instance, the book answered the intended purpose, may be presumed from the request of old Montaigne to his son, a few days before his death, to translate it into French from the Spanish original. His request was accordingly complied with; and the translation is referred to by Montaigne in the first edition of his *Essays*, printed at Bourdeaux in 1580; but the execution of this filial duty seems to have produced on Montaigne's own mind very different effects from what his father had anticipated.²

it has plainly suggested to Lord Clarendon some of the ideas; and even expressions, which occur in his account of Chillingworth.

¹ "The writings of the best authors among the ancients," Montaigne tells us on one occasion, "being full and solid, tempt and carry me which way almost they will. He that I am reading seems always to have the most force; and I find that every one in turn has reason, though they contradict one another." Book ii. chap. xii.

² The very few particulars known with respect to Sebonde have been collected by Bayle. See his *Dictionary*, Art. Sebonde.

The principal aim of Sebonde's book, according to Montaigne, is to show that "Christians are in the wrong to make human reasoning the basis of their belief, since the object of it is only conceived by faith, and by a special inspiration of the divine grace." To this doctrine Montaigne professes to yield an implicit assent; and, under the shelter of it, contrives to give free vent to all the extravagancies of skepticism. The essential distinction between the reason of man, and the instincts of the lower animals, is at great length, and with no inconsiderable ingenuity, disputed; the powers of the human understanding, in all inquiries, whether physical or moral, are held up to ridicule; an universal Pyrrhonism is recommended; and we are again and again reminded, that "*the senses are the beginning and the end of all our knowledge.*" Whoever has the patience to peruse this chapter with attention, will be surprised to find in it the rudiments of a great part of the licentious philosophy of the eighteenth century; nor can he fail to remark the address with which the author avails himself of the language afterwards adopted by Bayle, Helvetius, and Hume:—"That, to be a philosophical skeptick, is the first step towards becoming a sound believing Christian."¹ It is a melancholy fact in ecclesiastical history, that this insidious maxim should have been sanctioned, in our times, by some theologians of no common pretensions to orthodoxy; who, in direct contradiction to the words of Scripture, have ventured to assert, that "he who comes to God must first believe that he is not." Is it necessary to remind these grave retailers of Bayle's sly and ironical sophistry, that every argument for Christianity, drawn from its *internal* evidence, tacitly recognizes the

¹ This expression is Mr. Hume's; but the same proposition, in substance, is frequently repeated by the two other writers, and is very fully enlarged upon by Bayle in the *Illustration upon the Skepticks*, annexed to his Dictionary.

authority of human reason; and assumes, as the ultimate *criteria* of truth and of falsehood, of right and of wrong, certain fundamental articles of belief, discoverable by the light of Nature?'

Charron is well known as the chosen friend of Montaigne's latter years, and as the confidential depositary of his philosophical sentiments. Endowed with talents far inferior in force and originality to those of his master, he possessed, nevertheless, a much sounder and more regulated judgment; and as his reputation, notwithstanding the liberality of some of his peculiar tenets, was high among the most respectable and conscientious divines of his own church, it is far from improbable, that Montaigne committed to him the guardianship of his posthumous fame, from motives similar to those which influenced Pope, in selecting Warbur-

¹ "I once asked *Adrian Turnebus*," says Montaigne, "what he thought of Sebonde's treatise? The answer he made to me was, That he believed it to be some extract from *Thomas Aquinas*, for that none but a genius like his was capable of such ideas."

I must not, however, omit to mention, that a very learned Protestant, *Hugo Grotius*, has expressed himself to his friend *Bignon* not unfavourably of Sebonde's intentions, although the terms in which he speaks of him are somewhat equivocal, and imply but little satisfaction with the execution of his design. "Non ignoras quantum excoluerint istam materiam (*argumentum scil. pro Religione Christiana*) philosophica subtilitate Raimundus Sebundus, dialogorum varietate Ludovicus Vives, maxima autem tum eruditione tum facundia vestras Philippus Mornæus." The authors of the *Nouveau Dictionnaire Historique* (Lyons, 1804) have entered much more completely into the spirit and drift of Sebonde's reasoning, when they observe, "Ce livre offre des singularités hardies, qui plurent dans le temps aux philosophes de ce siècle, et qui ne déplairoient pas à ceux du notre."

It is proper to add, that I am acquainted with Sebonde only through the *medium* of Montaigne's version, which does not lay claim to the merit of strict fidelity; the translator himself having acknowledged, that he had given to the Spanish philosopher "un accoutrement à la Francoise, et qu'il l'a dévêtu de son port farouche et maintien barbaresque, de manière qu'il a mes-hui assez de facon pour se présenter en toute bonne compagnie."

ton as his literary executor. The discharge of this trust, however, seems to have done less good to Montaigne than harm to Charron; for, while the unlimited skepticism, and the indecent levities of the former, were viewed by the zealots of those days with a smile of tenderness and indulgence, the slighter heresies of the latter were marked with a severity the more rigorous and unrelenting, that, in points of essential importance, they deviated so very little from the standard of the Catholick faith. It is not easy to guess the motives of this inconsistency; but such we find from the fact to have been the temper of religious bigotry, or, to speak more correctly, of political religionism, in all ages of the world.¹

As an example of Charron's solicitude to provide an antidote against the more pernicious errors of his friend, I shall only mention his ingenious and philosophical attempt to reconcile, with the moral constitution of human nature, the apparent discordancy in the judgments of different nations concerning right and wrong. His argument on this point is in substance the very same with that so well urged by Beattie, in opposition to Locke's reasonings against the existence of innate practical principles. It is difficult to say, whether, in this instance, the coincidence between

¹ Montaigne, cet auteur charmant,
Tour à-tour profond et frivole,
Dans son chateau paisiblement,
Loin de tout frondeur malévole
Doutoit de tout impunément,
Et se moquoit très librement
Des bavards fourrés de l'école.
Mais quand son élève Charron,
Plus retenu, plus méthodique,
De sagesse donna leçon,
Il fut près de périr, dit on,
Par la haine théologique.

Voltaire, *Epître au Président Hénault*.

Montaigne and Locke, or that between Charron and Beattie, be the more remarkable.¹

Although Charron has affected to give to his work a systematical form, by dividing and subdividing it into books and chapters, it is in reality little more than an unconnected series of essays on various topicks, more or less distantly related to the science of Ethicks. On the powers of the understanding he has touched but slightly ; nor has he imitated Montaigne, in anatomizing, for the edification of the world, the peculiarities of his own moral character. It has probably been owing to the desultory and popular style of composition common to both, that so little attention has been paid to either by those who have treated of the history of French philosophy. To Montaigne's merits, indeed, as a lively and amusing essayist, ample justice has been done ; but his influence on the subsequent habits of thinking among his countrymen remains still to be illustrated. He has done more, perhaps, than any other author (I am inclined to think with the most honest intentions,) to introduce *into mens' houses* (if I may borrow an expression of Cicero) what is now called the *new philosophy*,—a philosophy certainly very different from that of Socrates. In the fashionable world, he has, for more than two centuries, maintained his place as the first of moralists ; a circumstance easily accounted for, when we attend to the singular combination, exhibited in his writings, of a semblance of erudition, with what Malebranche happily calls his *air du monde*, and *air cavalier*.² As for the graver

¹ See Beattie's *Essay on Fable and Romance* ; and Charron *de la Sagesse*, Liv. ii. c. 8. It may amuse the curious reader also to compare the theoretical reasonings of Charron with a Memoir in the *Phil. Trans.* for 1773 (by Sir Roger Curtis,) containing *some particulars with respect to the country of Labradore*.

² “ Ah l'aimable homme, qu'il est de bonne compagnie ! C'est mon ancien ami ; mais, à force d'être ancien, il m'est nouveau.” Madame de Sevigné.

and less attractive Charron, his name would probably before now have sunk into oblivion, had it not been so closely associated, by the accidental events of his life, with the more celebrated name of Montaigne.¹

The preceding remarks lead me, by a natural connexion of ideas (to which I am here much more inclined to attend than to the order of dates,) to another writer of the seventeenth century, whose influence over the literary and philosophical taste of France has been far greater than seems to be commonly imagined. I allude to the Duke of La Rochefoucauld, author of the *Maxims* and *Moral Reflections*.

Voltaire, was, I believe, the first who ventured to assign to La Rochefoucauld the preeminent rank which belongs to him among the French classicks. "One of the works," says he, "which contributed most to form the taste of the nation to a justness and precision of thought and expression, was the small collection of maxims by Francis Duke of La Rochefoucauld. Although there be little more than

¹ Montaigne himself seems, from the general strain of his writings, to have had but little expectation of the posthumous fame which he has so long continued to enjoy. One of his reflections on this head is so characteristical of the author as a man; and, at the same time, affords so fine a specimen of the graphical powers of his now antiquated style, that I am tempted to transcribe it in his own words: "J'écris mon livre à peu d'hommes et à peu d'années; s'il c'eût été une matière de durée, il l'eût fallu commettre à un langage plus ferme. Selon la variation continuelle qui a suivi le nôtre jusqu'à cette heure, qui peut espérer que sa forme présente soit en usage d'ici à cinquante ans? il écoule tous les jours de nos mains, et depuis que je vis, s'est altéré de moitié. Nous disons qu'il est à cette heure parfait: Autant en dit du sien chaque siècle. *C'est aux bons et utiles écrits de le clouer à eux, et ira sa fortune selon le crédit de notre état.*"

How completely have both the predictions in the last sentence been verified by the subsequent history of the French language!

one idea in the book, that *self-love is the spring of all our actions*, yet this idea is presented in so great a variety of forms, as to be always amusing. When it first appeared, it was read with avidity ; and it contributed, more than any other performance since the revival of letters, to improve the vivacity, correctness, and delicacy of French composition."

Another very eminent judge of literary merit (the late Dr Johnson) was accustomed to say of La Rochefoucauld's *Maxims*, that it was almost the only book written by a man of fashion, of which professed authors had reason to be jealous. Nor is this wonderful, when we consider the unwearied industry of the very accomplished writer, in giving to every part of it the highest and most finished polish which his exquisite taste could bestow. When he had committed a maxim to paper, he was in use to circulate it among his friends, that he might avail himself of their critical animadversions ; and, if we may credit Segrais, altered some of them no less than thirty times, before venturing to submit them to the publick eye.

That the tendency of these maxims is, upon the whole, unfavourable to morality, and that they always leave a disagreeable impression on the mind, must, I think, be granted. At the same time, it may be fairly questioned, if the motives of the author have in general been well understood, either by his admirers or his opponents. In affirming that *self-love is the spring of all our actions*, there is no good reason for supposing that he meant to deny the reality of moral distinctions as a philosophical truth ;—a supposition quite inconsistent with his own fine and deep remark, that *hypocrisy is itself an homage which vice renders to virtue*. He states it merely as a *fact*, which, in the course of his experience as a man of the world, he had found very generally verified in the higher classes of

society; and which he was induced to announce without any qualification or restriction, in order to give more force and poignancy to his satire. In adopting this mode of writing, he has unconsciously conformed himself, like many other French authors, who have since followed his example, to a suggestion which Aristotle has stated with admirable depth and acuteness in his *Rhetorick*. “Sentences or apophthegms lend much aid to eloquence. One reason of this is, that they flatter the *pride* of the hearers, who are delighted when the speaker, making use of general language, touches upon opinions which they had before known to be true in part. Thus, a person who had the misfortune to live in a bad neighbourhood, or to have worthless children, would easily assent to the speaker who should affirm, that *nothing* is more vexatious than to have any neighbours; *nothing* more irrational than to bring children into the world.”¹ This observation of Aristotle, while it goes far to account for the imposing and dazzling effect of these rhetorical exaggerations, ought to guard us against the common and popular error of mistaking them for the serious and profound generalizations of science. As for La Rochefoucauld, we know, from the best authorities, that, in private life, he was a conspicuous example of all those moral qualities of which he seemed to deny the existence; and that he exhibited, in this respect, a striking

¹ Εχουσι δε (γνωμαι) εις τους λογους βοηθειαν μεγαλην μιαν μεν δη δια φορτισιτητα των ακροατων· χαιρουσι γαρ, εαν τις καθολου λεγων, επιτυχη των δοξων, ας εκεινοι κατα μερος εχουσιν.—Η μεν γαρ γνωμη, ωσπερ ειρηται, καθολου αποφανσις εστι· χαιρουσι δε καθολου λεγομενου, ο κατα μερος προϋπολαμβανοντες τυγχανουσιν οιον, ειτις γειτοσι τυχη κεχημενος η τεκ.οις Φαυλοις, αποδεξαιτ αν του ειποντος, ουδεν γειτονιας χαλεπωτερον· η, οτι ουδεν ηλιθιωτερον τεχνοποιας. *Arist. Rhet. Lib. II. c. xx.*

The whole chapter is interesting and instructive, and shews how profoundly Aristotle had meditated the principles of the rhetorical art.

contrast to the Cardinal de Retz, who has presumed to censure him for his want of faith in the reality of virtue.

In reading La Rochefoucauld, it should never be forgotten, that it was within the vortex of a court he enjoyed his chief opportunities of studying the world; and that the narrow and exclusive circle in which he moved was not likely to afford him the most favourable specimens of human nature in general. Of the Court of Lewis XIV, in particular, we are told by a very nice and reflecting observer (Madame de la Fayette,) that “ambition and gallantry were *the soul*, actuating alike both men and women. So many contending interests, so many different cabals were constantly at work, and in all of these, women bore so important a part, that love was always mingled with business, and business with love. Nobody was tranquil or indifferent. Every one studied to advance himself by pleasing, serving, or ruining others. Idleness and languor were unknown, and nothing was thought of but intrigues or pleasures.”

In the passage already quoted from Voltaire, he takes notice of the effect of La Rochefoucauld's maxims, in improving the style of French composition. We may add to this remark, that their effect has not been less sensible in vitiating the tone and character of French philosophy, by bringing into vogue those false and degrading representations of human nature and of human life, which have prevailed in that country, more or less, for a century past. Mr. Addison, in one of the papers of the *Tatler*, expresses his indignation at this general bias among the French writers of his age. “It is impossible,” he observes, “to read a passage in Plato or Tully, and a thousand other ancient moralists, without being a greater and better man for it. On the contrary, I could never read any of our modish French authors, or those of our own country, who

are the imitators and admirers of that nation, without being, for some time, out of humour with myself, and at every thing about me. Their business is to depreciate human nature, and to consider it under the worst appearances; they give mean interpretations, and base motives to the worthiest actions. In short, they endeavour to make no distinction between man and man, or between the species of man and that of the brutes.”¹

It is very remarkable, that the censure here bestowed by Addison on the fashionable French wits of his time, should be so strictly applicable to Helvetius, and to many other of the most admired authors whom France has produced in our own day. It is still more remarkable to find the same depressing spirit shedding its malignant influence on French literature, as early as the time of La Rochefoucauld, and even of Montaigne; and to observe how very little has been done by the successors of these old writers, but to expand into grave philosophical systems their loose and lively paradoxes;—disguising and fortifying them by the aid of those logical principles, to which the name and authority of Locke have given so wide a circulation in Europe.

In tracing the origin of that false philosophy on which the excesses of the French revolutionists have entailed such merited disgrace, it is usual to remount no higher than to the profligate period of the Regency; but the seeds of its most exceptionable doctrines had been sown in that country at an earlier era, and were indebted for the luxuriance of their harvest, much more to the political and religious soil where they struck their roots, than to the

¹ *Tatler*, No. 103. The last paper of the *Tatler* was published in 1711; and, consequently, the above passage must be understood as referring to the *modish* tone of French philosophy, prior to the death of Louis XIV.

skill or foresight of the individuals by whose hands they were scattered.

I have united the names of Montaigne and of La Rochefoucauld, because I consider their writings as rather addressed to the world at large, than to the small and select class of speculative students. Neither of them can be said to have enriched the stock of human knowledge by the addition of any one important general conclusion ; but the maxims of both have operated very extensively and powerfully on the taste and principles of the higher orders all over Europe, and predisposed them to give a welcome reception to the same ideas, when afterwards reproduced with the imposing appendages of logical method, and of a technical phraseology. The foregoing reflections, therefore, are not so foreign as might at first be apprehended, to the subsequent history of ethical and of metaphysical speculation. It is time, however, now to turn our attention to a subject far more intimately connected with the general progress of human reason,—the philosophy of Descartes.

DESCARTES—GASSENDI—MALEBRANCHE.

According to a late writer,¹ whose literary decisions (excepting where he touches on religion or politicks) are justly entitled to the highest deference, Descartes has a better claim than any other individual, to be regarded as the father of that spirit of free inquiry, which, in modern Europe, has so remarkably displayed itself in all the various departments of knowledge. Of Bacon, he observes, “ that though he possessed, in a most eminent degree, the genius of philosophy, he did not unite with it the genius of

¹ Condorcet.

the sciences ; and that the methods proposed by him for the investigation of truth, consisting entirely of precepts which he was unable to exemplify, had little or no effect in accelerating the rate of discovery." As for Galileo, he remarks, on the other hand, " that his exclusive taste for mathematical and physical researches, disqualified him for communicating to the general mind that impulse of which it stood in need."

" This honour," he adds, " was reserved for Descartes, who combined in himself the characteristical endowments of both his predecessors. If, in the physical sciences, his march be less sure than that of Galileo—if his logick be less cautious than that of Bacon—yet the very temerity of his errors was instrumental to the progress of the human race. He gave activity to minds which the circumspection of his rivals could not awake from their lethargy. He called upon men to throw off the yoke of authority, acknowledging no influence but what reason should avow : and his call was obeyed by a multitude of followers, encouraged by the boldness, and fascinated by the enthusiasm of their leader."

In these observations, the ingenious author has rashly generalized a conclusion deduced from the literary history of his own country. That the works of Bacon were but little read there till after the publication of D'Alembert's Preliminary Discourse, is, I believe, an unquestionable fact ;¹ *not* that it necessarily follows from this, that, even in France, no previous effect had been produced by the labours of Boyle, of Newton, and of the other English ex-

¹ One reason for this is well pointed out by D'Alembert, " Il n'y a que les chefs de secte en tout genre, dont les ouvrages puissent avoir un certain éclat ; Bacon n'a pas été du nombre, et la forme de sa philosophie s'y opposoit : elle étoit trop sage pour étonner personne." *Disc. Prel.*

perimentalists, trained in Bacon's school. With respect to England, it is a fact not less certain, that at no period did the philosophy of Descartes produce such an impression on publick opinion, either in Physicks or in Ethicks, as to give the slightest colour to the supposition, that it contributed, in the most distant degree, to the subsequent advances made by our countrymen in these sciences. In Logick and Metaphysicks, indeed, the case was different. Here the writings of Descartes did much; and if they had been studied with proper attention, they might have done much more. But of *this* part of their merits, Condorcet seems to have had no idea. His eulogy, therefore, is rather misplaced than excessive. He has extolled Descartes as the father of Experimental Physicks: he would have been nearer the truth, if he had pointed him out as the father of the Experimental Philosophy of the Human Mind.

In bestowing this title on Descartes, I am far from being inclined to compare him, in the number or importance of *the facts* which he has remarked concerning our intellectual powers, to various other writers of an earlier date. I allude merely to his clear and precise conception of that operation of the understanding (distinguished afterwards in Locke's *Essay* by the name of *Reflection*,) through the medium of which all our knowledge of Mind is exclusively to be obtained. Of the essential subserviency of this power to every satisfactory conclusion that can be formed with respect to the mental phenomena, and of the futility of every theory which would attempt to explain them by metaphors borrowed from the material world, no other philosopher prior to Locke seems to have been fully aware; and from the moment that these truths were recognized as logical principles in the study of *mind*, a new era commences in the history of that branch of science. It will be

necessary, therefore, to allot to the illustration of this part of the Cartesian philosophy a larger space, than the limits of my undertaking will permit me to afford to the researches of some succeeding inquirers, who may, at first sight, appear more worthy of attention in the present times.

It has been repeatedly asserted by the Materialists of the last century, that Descartes was the first Metaphysician by whom the pure immateriality of the human soul was taught; and that the ancient philosophers, as well as the schoolmen, went no farther than to consider *mind* as the result of a material organization, in which the constituent elements approached to evanescence, in point of subtilty. Both of these propositions I conceive to be totally unfounded. That many of the schoolmen, and that the wisest of the ancient philosophers, when they described the mind as a *spirit*, or as a *spark of celestial fire*, employed these expressions *not* with any intention to materialize its essence, but merely from want of more unexceptionable language, might be shewn with demonstrative evidence, if this were the proper place for entering into the discussion. But what is of more importance to be attended to, on the present occasion, is the effect of Descartes' writings in disentangling the *logical principle* above mentioned, from the *scholastick* question about the nature of *mind*, as contradistinguished from *matter*. It were indeed to be wished, that he had perceived still more clearly and steadily the essential importance of keeping this distinction constantly in view; but he had at least the merit of illustrating, by his own example, in a far greater degree than any of his predecessors, the possibility of studying the mental phenomena, without reference to any facts but those which rest on the evidence of consciousness. The metaphysical question about the *nature* of mind he seems

to have considered as a problem, the solution of which was an easy corollary from these *facts*, if distinctly apprehended; but still as a problem, whereof it was possible that different views might be taken by those who agreed in opinion, as far as *facts* alone were concerned. Of this a very remarkable example has since occurred in the case of Mr. Locke, who, although he has been at great pains to shew, that the power of *reflection* bears the same relation to the study of the mental phenomena, which the power of *observation* bears to the study of the material world, appears, nevertheless, to have been far less decided than Descartes with respect to the essential distinction between Mind and Matter; and has even gone so far as to hazard the unguarded proposition, that there is no absurdity in supposing the Deity to have superadded to the other qualities of matter *the power of thinking*. His skepticism, however, on this point, did not prevent his good sense from perceiving, with the most complete conviction, the indispensable necessity of abstracting from the analogy of matter, in studying the laws of our intellectual frame.

The question about the nature or essence of the soul, has been, in all ages, a favourite subject of discussion among Metaphysicians, from its supposed connexion with the argument in proof of its immortality. In this light it has plainly been considered by both parties in the dispute; the one conceiving, that if Mind could be shewn to have no quality in common with Matter, its *dissolution* was physically impossible; the other, that if this assumption could be disproved, it would necessarily follow, that the *whole man* must perish at death. For the last of these opinions Dr. Priestley and many other speculative theologians have of late very zealously contended; flattering themselves, no doubt, with the idea, that they were thus preparing a triumph for their own peculiar schemes of Christianity.—

Neglecting, accordingly, all the presumptions for a future state, afforded by a comparison of the course of human affairs with the moral judgments and moral feelings of the human heart; and overlooking, with the same disdain, the presumptions arising from the narrow sphere of human knowledge, when compared with the indefinite improvement of which our intellectual powers seem to be susceptible; this acute but superficial writer attached himself exclusively to the old and hackneyed pneumatological argument; tacitly assuming as a principle, that the future prospects of man depend entirely on the determination of a *physical* problem, analogous to that which was then dividing chemists about the existence or non-existence of Phlogiston. In the actual state of science, these speculations might well have been spared. Where is the sober metaphysician to be found, who now speaks of the immortality of the soul as a logical consequence of its immateriality; instead of considering it as depending on the will of that Being by whom it was at first called into existence? And, on the other hand, is it not universally admitted by the best philosophers, that whatever hopes the light of nature encourages beyond the present scene, rest solely (like all our other anticipations of future events) on the general tenor and analogy of the laws by which we perceive the universe to be governed? The proper use of the argument concerning *the immateriality of mind*, is not to establish any positive conclusion as to its destiny hereafter; but to repel the reasonings alleged by materialists, as proofs that its annihilation must be the obvious and necessary effect of the dissolution of the body.¹

¹ “We shall here be content,” says the learned John Smith of Cambridge, “with that sober thesis of Plato, in his *Timæus*, who attributes the perpetuation of all substances to the benignity and liberality of the Creator; whom he therefore brings in

I thought it proper to state this consideration pretty fully, lest it should be supposed that the logical method recommended by Descartes for studying the phenomena of mind, has any necessary dependence on his metaphysical opinion concerning its being and properties, as a separate substance.¹ Between these two parts of his system, however, there is, if not a demonstrative connexion, at least a natural and manifest affinity; inasmuch as a steady adherence to his logical method (or, in other words, the habitual exercise of patient *reflection*,) by accustoming us to break asunder the obstinate associations to which materialism is indebted for the early hold it is apt to take of the fancy, gradually and insensibly predisposes us in favour of his metaphysical conclusion. It is to be regretted, that in stating this conclusion, his commentators should so frequently make use of the word *spirituality*; for which I do not recollect that his own works afford any authority.

thus speaking, *ὑμεῖς οὐκ ἐστὲ ἀθάνατοι οὐδὲ ἀλύττοι*, &c. *You are not of yourselves immortal nor indissoluble, but would relapse and slide back from that being which I have given you, should I withdraw the influence of my own power from you; but yet you shall hold your immortality by a patent from myself.*" (*Select Discourses*, Cambridge, 1660.) I quote this passage from one of the oldest partizans of Descartes among the English philosophers.

Descartes himself is said to have been of a different opinion. "On a été étonné," says Thomas, "que dans ses *Méditations Métaphysiques*, Descartes n'ait point parlé de l'immortalité de l'ame. Mais il nous apprend lui-même par une de ses lettres, qu'ayant établi clairement, dans cet ouvrage, la distinction de l'ame et de la matière, il suivoit nécessairement de cette distinction, que l'ame par sa nature ne pouvoit périr avec le corps." *Eloge de Descartes*. Note 21.

¹ I employ the scholastick word *substance*, in conformity to the phraseology of Descartes, but I am fully aware of the strong objections to which it is liable, not only as a wide deviation from popular use, which has appropriated it to things material and tangible, but as implying a greater degree of positive knowledge concerning the nature of *mind*, than our faculties are fitted to attain.—For some farther remarks on this point, see Note I.

The proper expression is *immateriality*, conveying merely a negative idea; and, of consequence, implying nothing more than a rejection of that hypothesis concerning the nature of Mind, which the scheme of materialism so gratuitously, yet so dogmatically assumes.¹

The power of reflection, it is well known, is the last of our intellectual faculties that unfolds itself; and, in by far the greater number of individuals, it never unfolds itself in any considerable degree. It is a fact equally certain, that, long before the period of life when this power begins to exercise its appropriate functions, the understanding is already preoccupied with a chaos of opinions, notions, impressions and associations, bearing on the most important objects of human inquiry; not to mention the innumerable sources of illusion and error connected with the use of a vernacular language, learned in infancy by rote, and identified with the first processes of thought and perception. The consequence is, that when Man begins to reflect, he finds himself (if I may borrow an allusion of M. Turgot's) lost in a labyrinth, into which he had been led blindfolded.² To the same purpose, it was long ago complained of by Bacon, "that no one has yet been found of so constant and severe a mind, as to have determined and tasked himself utterly to abolish theories and common notions, and to apply his intellect, altogether smoothed and even, to particulars anew. Accordingly, that human reason which we have, is a kind of medley and unsorted collection, from much trust and much accident, and the childish notions which we first drank in. Whereas, if one of ripe age and sound senses, and a mind tho-

¹ See Note K.

² "Quand l'homme a voulu se replier sur lui-meme il s'est trouvé dans un labyrinthe où il étoit entré les yeux bandés." *Oeuvres de Turgot*, Tom. II, p. 261.

roughly cleared, should apply himself freshly to experiment and particulars, of him were better things to be hoped."

What Bacon has here recommended, Descartes attempted to execute; and so exact is the coincidence of his views on this fundamental point with those of his predecessor, that it is with difficulty I can persuade myself that he had never read Bacon's works.¹ In the prosecution of this undertaking, the first steps of Descartes are peculiarly interesting and instructive; and it is *these* alone which merit our attention at present. As for the details of his system, they are now curious only as exhibiting an amusing contrast to the extreme rigour of the principle from whence the author sets out; a contrast so very striking, as fully to justify the epigrammatick saying of D'Alembert, that "Descartes began with doubting of every thing, and ended in believing that he had left nothing unexplained."

Among the various articles of common belief which Descartes proposed to subject to a severe scrutiny, he enumerates particularly, the conclusiveness of mathematical demonstration; the existence of God; the existence of the material world; and even the existence of his own body. The only thing that appeared to him certain and incontrovertible, was his own existence; by which he repeatedly reminds us, we are to understand merely the existence of *his mind* abstracted from all consideration of the material organs connected with it. About every other proposition, he conceived that doubts might reasonably be entertained; but to suppose the non-existence of *that* which thinks, at the very moment it is conscious of thinking, appeared to him a contradiction in terms. From this single postulatam, accordingly, he took his departure; resolved to admit noth-

¹ See Note L.

ing as a philosophical truth, which could not be deduced from it by a chain of logical reasoning. ¹

Having first satisfied himself of his own existence, his next step was to inquire, how far his perceptive and intellectual faculties were entitled to credit. For this purpose, he begins with offering a proof of the existence and attributes of God; truths which he conceived to be necessarily involved in the idea he was able to form of a perfect, self-existent, and eternal being. His reasonings on this point it would be useless to state. It is sufficient to observe, that they led him to conclude, that God cannot possibly be supposed to deceive his creatures; and therefore, that the intimations of our senses, and the decisions of our reason, are to be trusted to with entire confidence, wherever they afford us *clear and distinct ideas* of their respective objects. ²

¹ “Sic autem rejicientes illa omnia, de quibus aliquo modo possumus dubitare, ac etiam falsa esse fingentes, facile quidem supponimus nullum esse Deum, nullum coelum, nulla corpora; nosque etiam ipsos, non habere manus, nec pedes, nec denique ullum corpus; non autem ideo nos, qui talia cogitamus, nihil esse: repugnat enim, ut putemus, id quod cogitat, eo ipso tempore quo cogitat, non existere. Ac proinde haec cognitio, *ego cogito, ergo sum*, est omnium prima et certissima, quae cuilibet ordine philosophanti occurrat.” *Princip. Philos.* Pars I. § 7.

² The substance of Descartes' argument on these fundamental points, is thus briefly recapitulated by himself in the conclusion of his third Meditation:—“Dum in meipsum mentis aciem converto, non modo intelligo me esse rem incompletam, et ab alio dependentem, remque ad majora et meliora indefinite aspirantem, sed simul etiam intelligo illum, a quo pendeo, majora ista omnia non indefinite et potentia tantum, sed reipsa infinite in se habere, atque ita Deum esse; totaque vis argumenti in eo est, quod agnoscam fieri non posse ut existem talis naturae qualis sum, nempe ideam Dei in me habens, nisi revera Deus etiam existeret, Deus, inquam, ille idem cujus idea in me est, hoc est habens omnes illas perfectiones quas ego non comprehendere sed quocunque modo attingere cogitatione possum, et nullis planè defectibus obnoxius. Ex his satis patet, illum fallacem esse non posse: omnem enim fraudem et deceptionem à defectu aliquo pendere lumine naturali manifestum est.”

As Descartes conceived the existence of God (next to the existence of his own mind) to be the most indisputable of all truths, and rested his confidence in the conclusions of human reason entirely on his faith in the divine veracity, it is not surprising that he should have rejected the argument from *final causes*, as superfluous and unsatisfactory. To have availed himself of its assistance, would not only have betrayed a want of confidence in what he professed to regard as much more certain than any mathematical theorem; but would obviously have exposed him to the charge of first appealing to the divine attributes in proof of the authority of his faculties; and afterwards, of appealing to these faculties, in proof of the existence of God.

It is wonderful, that it should have escaped the penetration of this most acute thinker, that a *vicious circle* of the same description is involved in every appeal to the intellectual powers, in proof of their own credibility; and that unless this credibility be assumed as unquestionable, the farther exercise of human reason is altogether nugatory. The evidence for the existence of God seems to have ap-

The above argument for the existence of God (very improperly called by some foreigners an argument *a priori*.) was long considered by the most eminent men in Europe as quite demonstrative. For my own part, although I do not think that it is by any means so level to the apprehension of common inquirers, as the argument from the marks of *design* every where manifested in the universe, I am still less inclined to reject it as altogether unworthy of attention. It is far from being so metaphysically abstruse as the reasonings of Newton and Clarke, founded on our conceptions of *space* and of *time*; nor would it appear, perhaps, less logical and conclusive than that celebrated demonstration, if it were properly unfolded, and stated in more simple and popular terms. The two arguments, however, are in no respect, exclusive of each other; and I have always thought, that, by combining them together, a proof of the point in question might be formed, more impressive and luminous than is to be obtained from either, when stated apart.

peared to Descartes too irresistible and overwhelming, to be subjected to those logical canons which apply to all the other conclusions of the understanding. ¹

Extravagant and hopeless as these preliminary steps must now appear, they had nevertheless an obvious tendency to direct the attention of the author, in a singular degree, to the phenomena of thought; and to train him to those habits of abstraction from external objects, which, to the bulk of mankind, are next to impossible. In this way, he was led to perceive, with the evidence of consciousness, that the attributes of Mind were still more clearly and distinctly knowable than those of Matter; and that, in studying the former, so far from attempting to explain them by analogies borrowed from the latter, our chief aim ought to be, to banish as much as possible from the fancy, every analogy, and even every analogical expression, which, by inviting the attention abroad, might divert it from its proper business at home. In one word, that the only right method of philosophizing on this subject was comprised in the old stoical precept (understood in a sense somewhat different from that originally annexed to it) *nec te quaesiveris extra*. A just conception of this rule, and a steady adherence to its spirit, constitutes the

¹ How painful is it to recollect, that the philosopher who had represented his faith in the veracity of God, as the sole foundation of his confidence in the demonstrations of mathematicks, was accused and persecuted by his contemporaries as an atheist; and *that*, too, in the same country (Holland,) where, for more than half a century after his death, his doctrines were to be taught in all the universities with a blind idolatry! A zeal without knowledge, and the influence of those earthly passions, from which even protestant divines are not always exempted, may, it is to be hoped, go far to account for this inconsistency and injustice, without adopting the uncharitable insinuation of D'Alembert: "*Malgré toute la sagacité qu'il avoit employée pour prouver l'existence de Dieu, il fut accusé de la nier par des ministres, qui peut-être ne la croyoient pas.*"

groundwork of what is properly called the Experimental Philosophy of the Human Mind. It is thus that all our facts relating to Mind must be ascertained; and it is only upon facts thus attested by our own consciousness, that any just theory of Mind can be reared.

Agreeably to these views, Descartes, was, I think, the first who clearly saw, that our idea of Mind is not direct, but relative;—relative to the various operations of which we are conscious. What am I? he asks, in his second Meditation: A thinking being,—that is, a being doubting, knowing, affirming, denying, consenting, refusing, susceptible of pleasure and of pain.¹ Of all these things I might have had complete experience, without any previous acquaintance with the qualities and laws of matter; and therefore it is impossible that the study of matter can avail me aught in the study of myself. This, accordingly, Descartes laid down as a first principle; that *nothing comprehensible by the imagination can be at all subservient to the knowledge of Mind*; and that the sensible images involved in all our common forms of speaking concerning its operations, are to be guarded against with the most anxious care, as tending to confound, in our apprehensions, two classes of phenomena, which it is of the last importance to distinguish accurately from each other.²

¹ “Non sum compages illa membrorum, quae corpus humanum appellatur; non sum etiam tenuis aliquis aër istis membris infusus; non ventus, non ignis, non vapor, non halitus——Quid igitur sum? res cogitans; quid est hoc? nempe dubitans, intelligens, affirmans, negans, volens, nolens,” &c. *Med. Sec.*

² “Itaque cognosco, nihil eorum quae possum *Imaginatione* comprehendere, ad hanc quam de me habeo notitiam pertinere; mentemque ab illis diligentissime esse avocandam, ut suam ipsa naturam quam distinctissime percipiat. Ibid. A few sentences before, Descartes explains with precision in what sense *Imagination* is here to be understood. “Nihil aliud est *imaginari* quam rei corporeae figuram seu imaginem contemplari.”

To those who are familiarly acquainted with the writings of Locke, and of the very few among his successors who have thoroughly entered into the spirit of his philosophy, the foregoing observations may not appear to possess much either of originality or of importance; but when first given to the world, they formed the greatest step ever made in the science of Mind, by a single individual. What a contrast do they exhibit, not only to the discussions of the schoolmen, but to the analogical theories of Hobbes at the very same period! and how often

The following extracts from a book published at Cambridge in 1660 (precisely ten years after the death of Descartes,) while they furnish a useful comment on some of the above remarks, may serve to shew, how completely the spirit of the Cartesian philosophy of Mind had been seized, even *then*, by some of the members of that university.

“The souls of men exercising themselves first of all *κίνησις προβατική*, as the Greek philosopher expresseth himself, merely by a *progressive kind of motion*, spending themselves about bodily and material acts, and conversing only with sensible things; they are apt to acquire such deep stamps of material phantasms to themselves, that they cannot imagine their own *Being* to be any other than *material* and *divisible*, though of a fine ethereal nature. It is not possible for us well to know what our souls are, but only by their *κίνησις κυκλική*, their *circular or reflex motions*, and converse with themselves, which can only steal from them their own secrets.” Smith’s *Select Discourses*, p. 65. 66.

“If we reflect but upon our own souls, how manifestly do the notions of *reason*, *freedom*, *perception*, and the like, offer themselves to us, whereby we may *know* a thousand times *more distinctly* what our souls are, than what our bodies are. For the former we know, by an immediate converse with ourselves, and a distinct sense of their operations; whereas all our knowledge of the body is little better than merely historical, which we gather up by scraps and piecemeal, from more doubtful and uncertain experiments which we make of them; but the notions which we have of a *mind*, *i. e.* something within us that thinks, apprehends, reasons, and discourses, are so clear and distinct from all those notions which we can fasten upon a body, that we can easily conceive that if all *body-being* in the world were destroyed, yet we might then as well subsist as now we do.” Ibid. p. 98.

have they been since lost sight of, notwithstanding the clearest speculative conviction of their truth and importance, by Locke himself, and by the greatest part of his professed followers! Had they been duly studied and understood by Mr. Horne Tooke, they would have furnished him with a key for solving those etymological riddles, which, although mistaken by many of his contemporaries for profound philosophical discoveries, derive, in fact, the whole of their mystery, from the strong bias of shallow reasoners to *relapse* into the same scholastick errors, from which Descartes, Locke, Berkeley, Hume, and Reid, have so successfully laboured to emancipate the mind.

If any thing can add to our admiration of a train of thought manifesting in its author so unexampled a triumph over the strongest prejudices of sense, it is the extraordinary circumstance of its having first occurred to a young man, who had spent the years commonly devoted to academical study, amid the dissipation and tumult of camps.¹ Nothing could make this conceivable, but the very liberal education which he had previously received under the Jesuits, at the college of *La Flèche*;² where, we are told,

¹ “Descartes porta les armes, d’abord en Hollande, sous le célèbre Maurice de Nassau; de-là en Allemagne, sous Maximilien de Bavière, au commencement de la guerre de trente ans. Il passa ensuite au service de l’Empereur Ferdinand II, pour voir de plus près les troubles de la Hongrie. On croit aussi, qu’au siège de la Rochelle, il combattit, comme volontaire, dans une bataille contre la flotte Angloise.” Thomas, *Eloge de Descartes*, Note 8.

When Descartes quitted the profession of arms, he had arrived at the age of twenty-five.

² It is a curious coincidence, that it was in the same village of *La Flèche* that Mr. Hume fixed his residence, while composing his *Treatise of Human Nature*. Is it not probable, that he was partly attracted to it, by associations similar to those which presented themselves to the fancy of Cicero, when he visited the walks of the Academy?

that while yet a boy, he was so distinguished by habits of deep meditation, that he went among his companions by the name of *the Philosopher*. Indeed, it is only at that early age, that such habits are to be cultivated with complete success.

The glory, however, of having pointed out to his successors the true method of studying the theory of *Mind*, is almost all that can be claimed by Descartes in logical and metaphysical science. Many important hints, indeed, may be gleaned from his works; but, on the whole, he has added very little to our knowledge of human nature. Nor will this appear surprising, when it is recollected, that he aspired to accomplish a similar revolution in all the various departments of physical knowledge;—not to mention the time and thought he must have employed in those mathematical researches, which, however lightly esteemed by himself, have been long regarded as the most solid basis of his fame.¹

Among the principal articles of the Cartesian philosophy, which are now incorporated with our prevailing and most

In the beginning of Descartes' dissertation upon *Method*, he has given a very interesting account of the pursuits which occupied his youth! and of the considerations which suggested to him the bold undertaking of reforming philosophy.

¹ Such too is the judgment pronounced by D'Alembert. "Les mathématiques dont Descartes semble avoir fait assez peu de cas, font néanmoins aujourd'hui la partie la plus solide et la moins contestée de sa gloire." To this he adds a very ingenious reflection on the comparative merits of Descartes, considered as a geometer and as a philosopher. "Comme philosophe, il a peut-être été aussi grand, mais il n'a pas été si heureux. La Géométrie, qui par la nature de son objet doit toujours gagner sans perdre, ne pouvoit manquer, étant maniée par un aussi grand génie, de faire des progrès très-sensibles et apparens pour tout le monde. La philosophie se trouvoit dans un état bien différent, tout y étoit à commencer; et que ne coûtent point les premiers pas en tout genre! le mérite de les faire dispense de celui d'en faire de grands." *Disc. Prel.*

accredited doctrines, the following seem to me to be chiefly entitled to notice :

1. His luminous exposition of the common logical error of attempting to define words which express notions too simple to admit of analysis. Mr. Locke claims this improvement as entirely his own ; but the merit of it unquestionably belongs to Descartes, although it must be owned that he has not always sufficiently attended to it in his own researches.¹

2. His observations on the different classes of our prejudices ;—particularly on the errors to which we are liable in consequence of a careless use of language as the instrument of thought. The greater part of these observations, if not the whole, had been previously hinted at by Bacon ; but they are expressed by Descartes with greater precision and simplicity, and in a style better adapted to the taste of the present age.

3. The paramount and indisputable authority which, in all our reasonings concerning the human mind, he ascribes to the evidence of consciousness. Of this logical principle he has availed himself, with irresistible force, in refuting the scholastick sophisms against the liberty of human actions, drawn from the prescience of the Deity, and other considerations of a theological nature.

4. The most important, however, of all his improvements in metaphysics, is the distinction which he has so clearly and so strongly drawn between the *primary* and the *secondary* qualities of matter. This distinction was not

¹ “The names of simple ideas are not capable of any definitions ; the names of all complex ideas are. It has not, that I know, been yet observed by any body, what words are, and what are not capable of being defined.” (Locke’s *Essay*, Book iii, chap. iv, § iv.) Compare this with the *Principia* of Descartes, I, 10 ; and with Lord Stair’s *Philologia Nova Experimentalis*, pp. 9, and 79, printed at Leyden in 1686.

unknown to some of the ancient schools of philosophy in Greece ; but it was afterwards rejected by Aristotle, and by the schoolmen ; and it was reserved for Descartes to place it in such a light, as (with the exception of a very few skeptical or rather paradoxical theorists) to unite the opinions of all succeeding inquirers. For this step, so apparently easy, but so momentous in its consequences, Descartes was not indebted to any long or difficult processes of reasoning ; but to those habits of accurate and patient attention to the operations of his own mind, which, from his early years, it was the great business of his life to cultivate. It may be proper to add, that the epithets *primary* and *secondary*, now universally employed to mark the distinction in question, were first introduced by Locke ; a circumstance which may have contributed to throw into the shade the merits of those inquirers, who had previously struck into the same path.

As this last article of the Cartesian system has a close connexion with several of the most refined conclusions yet formed concerning the intellectual phenomena, I feel it due to the memory of the author, to pause for a few moments, in order to vindicate his claim to some leading ideas, commonly supposed by the present race of metaphysicians to be of much later origin. In doing so, I shall have an opportunity, at the same time, of introducing one or two remarks, which, I trust, will be useful in clearing up the obscurity, which is allowed by some of the ablest followers of Descartes and Locke, still to hang over this curious discussion.

I have elsewhere observed, that Descartes has been very generally charged by the writers of the last century, with a sophistical play upon words, in his doctrine concerning the

non-existence of secondary qualities; while, in fact, he was the first person by whom the fallacy of this scholastic paralogism was exposed to the world.¹ In proof of this, it might be sufficient to refer to his own statement, in the first part of the *Principia*;² but, for a reason which will immediately appear, I think it more advisable, on this occasion, to borrow the words of one of his earliest and ablest commentators. “It is only (says Father Malebranche) since the time of Descartes, that to those confused and indeterminate questions, whether fire is hot, grass green, and sugar sweet, philosophers are in use to reply, by distinguishing the equivocal meaning of the words ex-

¹ “Descartes, Malebranche, and Locke, revived the distinction between primary and secondary qualities. But they made the secondary qualities mere sensations, and the primary ones resemblances of our sensations. They maintained, that colour, sound, and heat, are not any thing in bodies, but sensations of the mind.——The paradoxes of these philosophers were only an abuse of words. For when they maintain, *as an important modern discovery*, that there is no heat in the fire, they mean no more, than that the fire does not feel heat, which every one knew before.”—*Reid's Inquiry*, chap. v, sect. viii.

² See sections lxi, lxx, lxxi. The whole of these three paragraphs is highly interesting; but I shall only quote two sentences, which are fully sufficient to shew, that, in the above observations, I have done Descartes no more than strict justice.

“Patet itaque in re idem esse, cum dicimus nos percipere colores in objectis, ac si diceremus nos percipere aliquid in objectis, quod quidem quid sit ignoramus, sed a quo efficitur in nobis ipsis sensus quidam valde manifestus et perspicuus, qui vocatur sensus colorum.——Cum vero putamus nos percipere colores in objectis, etsi revera nesciamus quidnam sit quod tunc nomine coloris appellamus, nec ullam similitudinem intelligere possimus, inter colorem quem supponimus esse in objectis, et illum quem experimur esse in sensu, quia tamen hoc ipsum non advertimus, et multa alia sunt, ut magnitudo, figura, numerus, &c. quae clare percipimus non aliter a nobis sentiri vel intelligi. quam ut sunt, aut saltem esse possunt in objectis, facile in eum errorem delabimur, ut judicemus id, quod in objectis vocamus *colorem*, esse quid omnino simile colori quem sentimus, atque ita ut id quod nullo modo percipimus, a nobis clare percipi arbitraremur.”

pressing sensible qualities. If by heat, cold, and savour, you understand such and such a disposition of parts, or some unknown motion of sensible qualities, then fire is hot, grass green, and sugar sweet. But if by heat and other qualities you understand what I feel by fire, what I see in grass, &c. fire is not hot, nor grass green; for the heat I feel, and the colours I see, are only in the soul.”¹ It is surprising how this, and other passages to the same purpose in Malebranche, should have escaped the notice of Dr. Reid; for nothing more precise on the ambiguity in the names of secondary qualities is to be found in his own works. It is still more surprising that Buffier, who might be expected to have studied with care the speculations of his illustrious countrymen, should have directly charged, not only Descartes, but Malebranche, with maintaining a paradox, which they were at so much pains to banish from the schools of philosophy.²

The important observations of Descartes upon this subject, made their way into England very soon after his death. They are illustrated at considerable length, and with great ingenuity, by Glanville, in his *Scepsis Scientifica*, published about thirteen years before Malebranche’s

¹ *Recherche de la Vérité*, Livre vi, chap. ii.

² “J’ai admiré souvent que d’aussi grands hommes que Descartes et Malebranche, avec leurs sectateurs, fissent valoir, comme une rare découverte de leur philosophie, que *la chaleur étoit dans nous-mêmes et nullement dans le feu*; au lieu que le commun des hommes trouvoient que *la chaleur étoit dans le feu aussi bien que dans nous*.——Mais en ce fameux débat, de quoi s’agit il? Uniquement de l’imperfection du langage, qui cau- soit une idée confuse par le mot de *chaleur*, ce mot exprimant également deux choses, qui à la vérité ont quelque rapport ou analogie, et pourtant qui sont très différentes; savoir, 1. le sentiment de chaleur que nous éprouvons en nous; 2. la disposition qui est dans le feu à produire en nous ce sentiment de chaleur.” *Cours de Sciences*, par le Père Buffier, p. 819. A Paris, 1732.

Search after Truth. So slow, however, is the progress of good sense, when it has to struggle against the prejudices of the learned, that, as lately as 1713, the paradox so clearly explained and refuted by Descartes, appears to have kept some footing in that university from which, about thirty years before, Mr. Locke had been expelled. In a paper of *the Guardian*, giving an account of a visit paid by Jack Lizard to his mother and sisters, after a year and a half's residence at Oxford, the following *precis* is given of his logical attainments. "For the first week(it is said) Jack dealt wholly in paradoxes. It was a common jest with him to pinch one of his sister's lapdogs, and afterwards prove he could not feel it. When the girls were sorting a set of knots, he would demonstrate to them that all the ribbons were of the same colour; or rather, says Jack, of no colour at all. My Lady Lizard herself, though she was not a little pleased with her son's improvements, was one day almost angry with him; for, having accidentally burnt her fingers as she was lighting the lamp for her teapot, in the midst of her anguish, Jack laid hold of the opportunity to instruct her, that there was no such thing as heat in the fire."

This miserable quibble about the non-existence of secondary qualities, never could have attracted the notice of so many profound thinkers, had it not been for a peculiar difficulty connected with our notions of *colour*, of which I do not know any one English philosopher who seems to have been sufficiently aware. That this quality belongs to the same class with sounds, smells, tastes, heat and cold, is equally admitted by the partizans of Descartes and of Locke; and must, indeed, appear an indisputable fact to all who are capable of reflecting accurately on the subject. But still, between *colour* and the other qualities now mentioned, a very important distinction must be allowed to exist. In the

case of smells, tastes, sounds, heat and cold, every person must immediately perceive, that his senses give him only *a relative idea* of the external quality ; in other words, that they only convey to him the knowledge of the existence of certain properties or powers in external objects, which fit them to produce certain sensations in his mind ; and accordingly, nobody ever hesitated a moment about the truth of this part of the Cartesian philosophy, in so far as *these* qualities alone are concerned. But, in the application of the same doctrine to *colour*, I have conversed with many, with whom I found it quite in vain to argue ; and *this*, not from any defect in their reasoning powers, but from their incapacity to reflect steadily on the subjects of their consciousness ; or rather, perhaps, from their incapacity to separate, as objects of the understanding, two things indissolubly combined by early and constant habit, as objects of the imagination. The silence of modern metaphysicians on this head is the more surprising, that D'Alembert long ago invited their attention to it as one of the most wonderful phenomena in the history of the human mind. "The bias we acquire," I quote his own words, "in consequence of habits contracted in infancy, to refer to a substance material and divisible, what really belongs to a substance spiritual and simple, is a thing well worthy of the attention of metaphysicians. Nothing," he adds, "is perhaps more extraordinary, in the operations of the mind, than to see it transport its sensations out of itself, and to spread them, as it were, over a substance to which they cannot possibly belong." It would be difficult to state the fact in question in terms more brief, precise, and perspicuous.

That the illusion, so well described in the above quotation, was not overlooked by Descartes and Malebranche, appears unquestionably, from their extreme solicitude to reconcile it with that implicit faith, which, from religious con-

siderations, they conceived to be due to the testimony of those faculties with which our Maker has endowed us. Malebranche, in particular, is at pains to distinguish between the sensation, and the judgment combined with it. "The sensation never deceives us; it differs in no respect from what we conceive it to be. The *judgment*, too, is natural, or rather (says Malebranche,) *it is only a sort of compounded sensation* ;' but this judgment leads us into no error with respect to philosophical truth. The moment we exercise our reason, we see the fact in its true light, and can account completely for that illusive appearance which it presents to the imagination."

Not satisfied, however, with this solution of the difficulty, or rather perhaps apprehensive that it might not appear quite satisfactory to some others, he has called in to his assistance the doctrine of *original sin* ; asserting, that all the mistaken judgments which our constitution leads us to form concerning external objects and their qualities, are the consequences of the fall of our first parents; since which *adventure* (as it is somewhat irreverently called by Dr. Beattie,) it requires the constant vigilance of reason to guard against the numberless tricks and impostures practised upon us by our external senses.² In another passage, Malebranche observes very beautifully (though not very consistently with his theological argument on the same point,) that our senses being given us for the preservation

¹ He would have expressed himself more accurately, if he had said, that the judgment is indissolubly combined with the sensation; but his meaning is sufficiently obvious.

² "We are ^{first} informed by Father Malebranche, that the senses were at first as honest faculties as one could desire to be endued with, till after they were debauched by original sin; *an adventure* from which they contracted such an invincible propensity to cheating, that they, are now continually lying in wait to deceive us." *Essay on Truth*, p. 241, second edition.

of our bodies, it was requisite for our well being, that we should judge as we do of sensible qualities. “In the case of the sensations of *pain* and of *heat*, it was much more advantageous that we should *seem* to feel them in those parts of the body which are immediately affected by them, than that we should associate them with the external objects by which they are occasioned ; because pain and heat, having the power to injure our members, it was necessary that we should be warned in what place to apply the remedy ; whereas *colours* not being likely, in ordinary cases, to hurt the eye, it would have been superfluous for us to know that they are painted on the *retina*. On the contrary, as they are only useful to us, from the information they convey with respect to things external, it was essential that we should be so formed as to attach them to the corresponding objects on which they depend.¹

¹ *Recherche de la Verite*, Liv. i, chap. xiii. § 5. In Dr Reid’s strictures on Descartes and Locke there are two remarks which I am at a loss how to reconcile. “Colour,” says he, “differs from other secondary qualities in this, that whereas the name of the quality is sometimes given to the sensation which indicates it, and is occasioned by it, we never, as far as I can judge, give the name of *colour* to the sensation, but to the quality only.” A few sentences before, he had observed, “That when we think or speak of any particular colour, however simple the notion may seem to be which is presented to the imagination, it is really in some sort compounded. It involves an unknown cause, and a known effect. The name of *colour* belongs indeed to the cause only, and not to the effect. But as the cause is unknown, we can form no distinct conception of it, but by its relation to the known effect. And, therefore, both go together in the imagination, and are so closely united, that they are mistaken for one simple object of thought.” *Inquiry*, chap. vi, sect. 4.

These two passages, seem quite inconsistent with each other. If in the perception of colour, the sensation and the quality “be so closely united as to be mistaken for one single object of thought,” does it not obviously follow, that it is to this compounded notion the name of *colour* must, in general, be given ? On the other hand, when it is said *that the name of colour is never given to the sensa-*

The two following remarks, which I shall state with all possible brevity, appear to me to go far towards a solution of the problem proposed by D'Alembert.

1. According to the *new* theory of vision, *commonly* (but, as I shall afterwards shew, not altogether *justly*) ascribed to Dr. Berkeley, lineal distance from the eye is not an original perception of sight. In the meantime, from the first moment that the eye opens, the most intimate connexion must necessarily be established between the notion of *colour* and those of visible extension and figure. At first, it is not improbable that all of them may be conceived to be merely *modifications* of the mind; but, however this may be, the manifest consequence is, that when a comparison between the senses of Sight and of Touch has taught us to refer to a distance the objects of the one, the indissolubly associated sensations of the other must of course accompany them, how far soever that distance may extend.¹

2. It is well known to be a general law of our constitution, when one thing is destined, either by nature or by convention, to be *the sign* of another, that the mind has a disposition to pass on, as rapidly as possible, to the thing signified, without dwelling on *the sign* as an object worthy of its attention. The most remarkable of all examples of this occurs in the acquired perceptions of sight, where our estimates of distance are frequently the result of an intellectual process, comparing a variety of different *signs* together, without a possibility on our part, the moment afterwards, of recalling one single step of the process to our recollection. Our inattention to the sensations of colour,

tion but to the quality only, does not this imply, that every time the word is pronounced, the quality is separated from the sensation, even in the imaginations of the vulgar?

¹ See Note M.

considered as affections of the Mind, or as modifications of our own being, appears to me to be a fact of precisely the same description; for all these sensations were plainly intended by nature to perform the office of *signs*, indicating to us the figures and distances of things external. Of their essential importance in this point of view, an idea may be formed, by supposing for a moment the whole face of nature to exhibit only one uniform colour, without the slightest variety even of light and shade. Is it not self evident that, on this supposition, the organ of sight would be entirely useless, inasmuch as it is by the *varieties* of colour alone that the outlines or visible figures of bodies are so defined, as to be distinguishable one from another? Nor could the eye, in this case, give us any information concerning diversities of *distance*; for all the various signs of it, enumerated by optical writers, presuppose the antecedent recognition of the bodies around us, as separate objects of perception. It is not therefore surprising, that *signs* so indispensably subservient to the exercise of our noblest sense, should cease, in early infancy, to attract notice as the subjects of our consciousness; and that afterwards they should present themselves to the imagination rather as qualities of Matter, than as attributes of Mind.¹

¹ In Dr. Reid's Inquiry, he has introduced a discussion concerning the perception of *visible figure*, which has puzzled me since the first time (more than forty years ago) that I read his work. The discussion relates to this question, Whether "there be any sensation proper to visible figure, by which it is suggested in vision?" The result of the argument is, that "our eye *might* have been so framed as to suggest the figure of the object, without suggesting colour, or any other quality; and, of consequence, that there seems to be *no sensation* appropriated to visible figure; this quality being suggested *immediately* by the material impression upon the organ, of which impression we are not conscious." (*Inquiry*, &c. chap. vi, sect. 8.) To my apprehension, nothing can

To this reference of the sensation of colour to the external object, I can think of nothing so analogous as the feelings we experience in surveying a library of books.— We speak of the volumes piled upon its shelves, as *treasures* or *magazines* of the knowledge of past ages; and contemplate them with gratitude and reverence, as inexhaustible *sources* of instruction and delight to the mind. Even in looking at a page of print or of manuscript, we are apt to say, that the ideas we acquire are received by the sense of sight; and we are scarcely conscious of a metaphor, when we employ this language. On such occasions we seldom recollect, that nothing is perceived by the eye but a multitude of *black strokes drawn upon white paper*, and that it is our own acquired habits which communicate to these *strokes* the whole of that significancy whereby they are distinguished from the unmeaning scrawling of an infant or a changeling. The knowledge which we conceive to be preserved in books, like the fragrance of a rose, or the gilding of the clouds, depends, for its existence, on the *relation* between the object and the percipient mind; and the only difference between the two cases is, that in the one, this relation is the local and temporary effect of conventional habits; in the other, it is the universal and the unchangeable work of nature. The art of printing, it is to be hoped, will in future render the former relation, as well as the latter, coëval with our species; but, in the past history of mankind, it is impossible to say how often it may have been dissolved. What vestiges can now be traced of

appear more manifest than this, that, if there had been no *variety* in our sensations of colour, and still more, if we had had no sensation of colour whatsoever, the organ of sight could have given us no information, either with respect to *figures* or to *distances*; and, of consequence, would have been as useless to us, as if we had been afflicted, from the moment of our birth, with a *gutta serena*.

those scientific attainments which, in early times, drew to *Egypt*, from every part of the civilized world, all those who were anxious to be initiated in the mysteries of philosophy? The symbols which still remain in that celebrated country, inscribed on eternal monuments, have long lost the correspondent *minds* which reflected upon them their own intellectual attributes. To us they are useless and silent, and serve only to attest the existence of arts, of which it is impossible to unriddle the nature and the objects.

Variis nunc sculpta figuris
Marmora, trunca tamen visuntur mutaque nobis;
Signa repertorum tuimur, cecidere reperta.

What has now been remarked with respect to *written characters*, may be extended very nearly to *oral language*. When we listen to the discourse of a publick speaker, eloquence and persuasion seem to issue from his lips; and we are little aware, that we ourselves infuse the soul into every word that he utters. The case is exactly the same when we enjoy the conversation of a friend. We ascribe the charm entirely to his voice and accents; but without our cooperation, its potency would vanish. How very small the comparative proportion is, which, in such cases, the words spoken contribute to the intellectual and moral effect, I have elsewhere endeavoured to show.

I have enlarged on this part of the Cartesian system, *not* certainly on account of its intrinsick value, as connected with the theory of our external perceptions (although even in *this* respect of the deepest interest to every philosophical inquirer,) but because it affords the most palpable and striking example I know of, to illustrate the indissoluble associations established during the period of infancy, between the intellectual and the material worlds. It was plainly

the intention of nature, that our thoughts should be habitually directed to things external; and accordingly, the bulk of mankind are not only indisposed to study the intellectual phenomena, but are incapable of that degree of reflection which is necessary for their examination. Hence it is, that when we begin to analyze our own internal constitution, we find the facts it presents to us so very intimately combined in our conceptions with the qualities of matter, that it is impossible for us to draw distinctly and steadily the line between them; and that, when Mind and Matter are concerned in the same result, the former is either entirely overlooked, or is regarded only as an accessory principle, dependent for its existence on the latter. To the same cause it is owing, that we find it so difficult (if it be at all practicable) to form an idea of any of our intellectual operations, abstracted from *the images* suggested by their metaphorical names. It was objected to Descartes by some of his contemporaries, that the impossibility of accomplishing the *abstractions* which he recommended, furnished of itself a strong argument against the soundness of his doctrines.¹ The proper answer to this objection does not seem to have occurred to him; nor, so far as I know, to any of his successors;—that the abstractions of the *understanding* are totally different from the abstractions of the *imagination*; and that we may *reason* with most logical correctness about things considered apart, which it is impossible, even in thought, to *conceive* as separated from each other. His own speculations concerning the indissolubility of the union established in the mind between the sensations of colour and the primary qualities of extension and figure, might have furnished him, on this occasion, with a triumphant reply to his adversaries; not

¹ See, in particular, *Gassendi Opera*, Tom. III, pp. 300, 301, Lugduni, 1658.

to mention that the variety of metaphors, equally fitted to denote the same intellectual powers and operations, might have been urged as a demonstrative proof, that none of these metaphors have any connexion with the general laws to which it is the business of the philosopher to trace the mental phenomena.

When Descartes established it as a general principle, that *nothing conceivable by the power of imagination, could throw any light on the operations of thought* (a principle which I consider as exclusively his own,) he laid the foundation-stone of the Experimental Philosophy of the Human Mind. That the same truth had been previously perceived more or less distinctly, by Bacon and others, appears probable from the general complexion of their speculations ; but which of them has expressed it with equal precision, or laid it down as a fundamental maxim in their logick ? It is for this reason, that I am disposed to date the origin of the true Philosophy of Mind from the *Principia* of Descartes rather than from the *Organon* of Bacon, or the *Essay* of Locke ; without, however, meaning to compare the French author with our two countrymen, either as a contributor to our stock of *facts* relating to the intellectual phenomena, or as the author of any important conclusion concerning the general laws to which they may be referred. It is mortifying to reflect on the inconceivably small number of subsequent inquirers by whom the spirit of this cardinal maxim has been fully seized ; and that, even in our own times, the old and inveterate prejudice to which it is opposed, should not only have been revived with success, but should have been very generally regarded as an original and profound discovery in metaphysical science. These circumstances must plead my apology for the space I have assigned to the Cartesian Metaphysics in the crowded historical picture which I am at

present attempting to sketch. The fulness of illustration which I have bestowed on the works of the master, will enable me to pass over those of his disciples, and even of his antagonists, with a correspondent brevity.¹

After having said so much of the singular merits of Descartes as the father of genuine metaphysicks, it is incumbent on me to add, that his errors in this science were on a scale of proportionate magnitude. Of these the most prominent (for I must content myself with barely mentioning a few of essential importance) were his obstinate rejection of all speculations about final causes;² his hypothesis concerning the lower animals, which he considered as mere machines;³ his doctrine of *innate* ideas,

¹ The Cartesian doctrine concerning the secondary qualities of matter, is susceptible of various other important applications. Might it not be employed, at least as an *argumentum ad hominem* against Mr. Hume and others, who, admitting *this* part of the Cartesian system, seem nevertheless to have a secret leaning to the scheme of materialism? Mr. Hume has somewhere spoken of *that little agitation of the brain we call thought*. If it be unphilosophical to confound our *sensations* of colour, of heat, and of cold, with such qualities of extension, figure, and solidity, is it not, if possible, still more so, to confound with these qualities the phenomena of thought, of volition, and of moral emotion?

² It is not unworthy of notice, that, in spite of his own logical rules, Descartes sometimes seems insensibly to adopt, on this subject, the common ideas and feelings of mankind. Several instances of this occur in his treatise on the Passions, where he offers various conjectures concerning the *uses* to which they are subservient. The following sentence is more peculiarly remarkable: "Mihi persuadere nequeo, naturam incedisse hominibus ullum affectum qui semper visiosus sit, nullumque usum bonum et laudabile habeat." Art. clxxv.

³ This hypothesis never gained much ground in England; and yet a late writer of distinguished eminence in *some* branches of science, has plainly intimated that, in his opinion, the balance of probabilities inclined in its favour. "I omit mentioning other animals here," says Mr. Kirwan in his *Meta-*

as understood and expounded by himself;¹ his noted paradox of placing the essence of mind in thinking, and of matter in extension;² and his new modification of the ideal theory of perception, adopted afterwards, with some very slight changes, by Malebranche, Locke, Berkeley, and Hume.³ To some of these errors I shall have occasion to refer in the sequel of this Discourse. The foregoing slight enumeration is sufficient for my present purpose.

In what I have hitherto said of Descartes, I have taken no notice of his metaphysicological theories relative to the connexion between soul and body. Of these theories, however, groundless and puerile as they are, it is necessa-

physical Essays, "as it is at least doubtful whether they are not mere automats." *Met. Essays*, p. 41, Lond. 1809.

¹ I have added the clause in *Italicks*, because, in Descartes' reasonings on this question, there is no inconsiderable portion of most important truth, debased by a large and manifest alloy of error.

² To this paradox may be traced many of the conclusions of the author, both on physical and on metaphysical subjects. One of the most characteristical features, indeed, of his genius, is the mathematical concatenation of his opinions, even on questions which, at first sight, seem the most remote from each other; a circumstance which, when combined with the extraordinary perspicuity of his style, completely accounts for the strong hold his philosophy took of every mind, thoroughly initiated, at an early period of life, in its principles and doctrines. In consequence of conceiving the essence of matter to consist in extension, he was necessarily obliged to maintain the doctrine of a universal *plenum*; upon which doctrine the theory of the vortices came to be grafted by a very short and easy process. The same idea forced him, at the very outset of his *Metaphysical Meditations*, to assert, much more dogmatically than his premises seem to warrant, the *non-extension* of Mind; and led him on many occasions to blend, very illogically, this comparatively disputable dogma, with the facts he has to state concerning the mental phenomena.

³ See Note N.

ry for me, before I proceed farther, to say a few words, on account of their extensive and lasting influence on the subsequent history of the science of Mind, not only upon the Continent, but in our own Island.

The hypothesis of Descartes, which assigns to the soul for its principal seat the *pineal gland* or *conarion*, is known to every one who has perused the *Alma* of Prior. It is not, perhaps, equally known, that the circumstance which determined him to fix on this particular spot, was the very plausible consideration, that, among the different parts of the brain, *this* was the only one he could find, which, being single and central, was fitted for the habitation of a being, of which he conceived unity and indivisibility to be essential and obvious attributes.¹ In what manner the *animal spirits*, by their motions forwards and backwards in the nervous tubes, keep up the communication between this gland and the different parts of the body, so as to produce the phenomena of perception, memory, imagination, and muscular motion, he has attempted particularly to explain; describing the processes by which these various effects are accomplished, with as decisive a tone of authority, as if he had been demonstrating experimentally the circulation of the blood. How curious to meet with such speculations in the works of the same philosopher, who had so clearly perceived the necessity, in studying the laws of Mind, of abstracting entirely from the analogies of Matter; and who, at the outset of his inquiries, had carried his skepticism so far, as to require a proof even of the existence of his own body! To those, however, who reflect with attention on the *method* adopted by Descartes this inconsistency will not appear so inexplicable as at first sight may be imagined; inasmuch as the same skept-

¹ See in particular, the *Treatise de Passionibus*, Art. 31, 32. See also Note O.

ticism which led him to suspend his faith in his intellectual faculties till he had once proved to his satisfaction, from the necessary veracity of God, that these faculties were to be regarded as the divine oracles, prepared him, in all the subsequent steps of his progress, to listen to the suggestions of his own fallible judgment, with more than common credulity and confidence.

The ideas of Descartes, respecting the communication between soul and body, are now so universally rejected, that I should not have alluded to them here, had it not been for their manifest influence in producing, at the distance of a century, the rival hypothesis of Dr. Hartley. The first traces of this hypothesis occur in some *queries* of Sir Isaac Newton, which he was probably induced to propose, less from the conviction of his own mind, than from a wish to turn the attention of philosophers to an examination of the correspondent part of the Cartesian system. Not that I would be understood to deny that this great man seems, on more than one occasion, to have been so far misled by the example of his predecessor, as to indulge himself in speculating on questions altogether unsusceptible of solution. In the present instance, however, there cannot, I apprehend, be a doubt, that it was the application made by Descartes of the old theory of *animal spirits*, to explain the mental phenomena, which led Newton into that train of thinking which served as the groundwork of Hartley's *Theory of Vibrations*.¹

¹ The physiological theory of Descartes, concerning the connexion between soul and body, was adopted, together with some of his sounder opinions, by a contemporary English philosopher, Mr. Smith of Cambridge, whom I had occasion to mention in a former note; and that, for some time after the beginning of the eighteenth century, it continued to afford one of the chief subjects of controversy between the two English universities, the *Alma* of Prior affords incontestible evidence. From the same poem it appears, how much the reveries of Descartes about the

It would be useless to dwell longer on the reveries of a philosopher, much better known to the learned of the present age by the boldness of his exploded errors, than by the profound and important truths contained in his works. At the period when he appeared, it may perhaps be questioned, Whether the truths which he taught, or the errors into which he fell, were most instructive to the world. The controversies provoked by the latter had cer-

seat of the soul, contributed to wean the wits of Cambridge from their former attachment to the still more incomprehensible pneumatology of the schoolmen.

Here Matthew said,
Alma in verse, in prose the mind
By Aristotle's pen defin'd,
Throughout the body squat or tall,
Is, *bona fide*, all in all.
And yet, slap-dash, is all again
In every sinew, nerve, and vein;
Runs here and there like Hamlet's Ghost,
While every where she rules the roast.

'This system, Richard, we are told,
The men of Oxford firmly hold;
The Cambridge wits, you know, deny
With *ipse dixit* to comply.
They say (for in good truth they speak
With small respect of that old Greek)
That, putting all his words together,
'Tis three blue beans in one blue bladder.

Alma, they strenuously maintain,
Sits cock-horse on her throne the brain,
And from that seat of thought dispenses
Her sovereign pleasure to the senses, &c. &c.

The whole poem, from beginning to end, is one continued piece of ridicule upon the various hypothesis of physiologists concerning the nature of the communication between soul and body. The amusing contrast between the solemn absurdity of these disputes, and the light pleasantry of the excursions to which they lead the fancy of the poet, constitutes the principal charm of this performance; by far the most original and characteristic of all Prior's Works.

tainly a more immediate and palpable effect in awakening a general spirit of free inquiry. To this consideration may be added an ingenious and not altogether unsound remark of D'Alembert, that "when absurd opinions are become inveterate, it is sometimes necessary to replace them by other errors, if nothing better can be done. Such (he continues) are the uncertainty and the vanity of the human mind, that it has always need of *an opinion* on which it may lean; it is a child to whom a plaything must occasionally be presented in order to get out of its hands a mischievous weapon: the plaything will soon be abandoned, when the light of reason begins to dawn."¹

Among the opponents of Descartes, Gassendi was one of the earliest, and by far the most formidable. No two philosophers were ever more strongly contrasted, both in point of talents and of temper; the former as far superiour to the latter in originality of genius—in powers of concentrated attention to the phenomena of the internal world—in classical taste—in moral sensibility, and in all the rarer gifts of the mind; as he fell short of him in erudition—in industry as a bookmaker—in the justness of his logical views, so far as the phenomena of the *material* universe are concerned—and, in general, in those literary qualities and attainments, of which the bulk of mankind either are, or think themselves best qualified, to form an estimate. The reputation of Gassendi, accordingly, seems to have been at its height in his own lifetime; that of Descartes made but little progress, till a considerable time after his death.

The comparative justness of Gassendi's views in natural philosophy, may be partly, perhaps chiefly, ascribed to his diligent study of Bacon's works; which Descartes (if

¹ See Note P.

he ever read them,) has nowhere alluded to in his writings. This extraordinary circumstance in the character of Descartes, is the more unaccountable, that not only Gassendi, but some of his other correspondents, repeatedly speak of Bacon, in terms, which one should think could scarcely have failed to induce him to satisfy his own mind whether their encomiums were well or ill founded. One of these, while he contents himself, from very obvious feelings of delicacy, with mentioning the Chancellor of England, as the person who, *before the time of Descartes*, had entertained the justest notions about the method of prosecuting physical inquiries, takes occasion, in the same letter, to present him, in the form of a friendly admonition from himself, with the following admirable summary of the *instauratio magna*. "To all this it must be added, that no architect, however skilful, can raise an edifice, unless he be provided with proper materials. In like manner, your *method*, supposing it to be perfect, can never advance you a single step in the explanation of natural causes, unless you are in possession of the facts necessary for determining their effects. They who, without stirring from their libraries, attempt to discourse concerning the works of nature, may indeed tell us what sort of world they would have made, if God had committed that task to their ingenuity; but, without a wisdom truly divine, it is impossible for them to form an idea of the universe, at all approaching to that in the mind of its Creator. And, although your *method* promises every thing that can be expected from human genius, it does not, therefore, lay any claim to the art of divination; but only boasts of deducing from the assumed *data*, all the truths which follow from them as legitimate consequences; which *data*, can, in physicks, be nothing else but principles previously established by experiment."¹ In Gassen-

¹ See the first Epistle to Descartes, prefixed to his *Treatise on the Passions*. Amstel. 1664.

di's controversies with Descartes, the name of Bacon seems to be studiously introduced on various occasions, in a manner still better calculated to excite the curiosity of his antagonist; and in his historical review of logical systems, the *heroical attempt which gave birth to the Novum Organon* is made the subject of a separate chapter, immediately preceding that which relates to the *Metaphysical Meditations* of Descartes.

The partiality of Gassendi for the Epicurean physicks, if not originally imbibed from Bacon, must have been powerfully encouraged by the favourable terms in which he always mentions the Atomick or Corpuscular theory. In its conformity to that luminous simplicity which everywhere characterizes the operations of nature, this theory certainly possesses a decided superiority over all the other conjectures of the ancient philosophers concerning the material universe; and it reflects no small honour on the sagacity both of Bacon and of Gassendi, to have perceived so clearly the strong analogical presumption which this conformity afforded in its favour, prior to the unexpected lustre thrown upon it by the researches of the Newtonian school. With all his admiration, however, of the Epicurean physicks, Bacon nowhere shews the slightest leaning towards the metaphysical or ethical doctrines of the same sect; but, on the contrary, considered (and, I apprehend, rightly considered) the atomick theory as incomparably more hostile to atheism, than the hypothesis of four mutable elements, and of one immutable fifth essence. In this last opinion, there is every reason to believe that Gassendi fully concurred; more especially, as he was a zealous advocate for the investigation of *final causes*, even in inquiries strictly physical. At the same time, it cannot be denied, that, on many questions, both of Metaphysics and of Ethicks, this very learned theologian (one of

the most orthodox, *professedly*, of whom the Catholick church has to boast,) carried his veneration for the authority of Epicurus to a degree bordering on weakness and servility; and although, on such occasions, he is at the utmost pains to guard his readers against the dangerous conclusions commonly ascribed to his master, he has nevertheless retained more than enough of his system to give a plausible colour to a very general suspicion, that he secretly adopted more of it than he chose to avow.

As Gassendi's attachment to the physical doctrines of Epicurus, predisposed him to give an easier reception than he might otherwise have done to his opinions in Metaphysics and in Ethicks, so his unqualified contempt for the hypothesis of the Vortices, seems to have created in his mind an undue prejudice against the speculations of Descartes on all other subjects. His objections to the argument by which Descartes has so triumphantly established the distinction between Mind and Matter, as separate and heterogeneous objects of human knowledge, must now appear, to every person capable of forming a judgment upon the question, altogether frivolous and puerile; amounting to nothing more than this, that all our knowledge is received by the channel of the external senses,—insomuch, that there is not a single object of the understanding which may not be ultimately analyzed into *sensible images*; and of consequence, that when Descartes proposed to abstract from these images in studying the mind, he rejected the only materials out of which it is possible for our faculties to rear any superstructure. The sum of the whole matter is (to use his own language,) that “there is no real distinction between *imagination* and *intellection* ;” meaning, by the former of these words, the power which the mind possesses of *representing* to itself the material objects and qualities it has previously perceived. It is evident, that

this conclusion coincides exactly with the tenets inculcated in England at the same period by his friend Hobbes,¹ as well as with those revived at a latter period by Diderot, Horne Tooke, and many other writers, both French and English, who, while they were only repeating the exploded dogmas of Epicurus, fancied they were pursuing, with miraculous success; the new path struck out by the genius of Locke.

It is worthy of remark, that the argument employed by Gassendi against Descartes, is copied almost *verbatim* from his own version of the account given by *Diogenes Laertius* of the sources of our knowledge, according to the principles of the Epicurean philosophy;²—so very little is there of novelty in the consequences deduced by modern materialists from the scholastick proposition, *Nihil est in intellectu quod non fuit prius in sensu*. The same doctrine is very concisely and explicitly stated in a maxim formerly quoted from Montaigne, that “the senses are the *beginning* and *end* of all our knowledge;”—a maxim which Montaigne learned from his oracle Raymond de Sebonde;—which, by the present race of French philosophers, is almost universally supposed to be sanctioned by the authority of Locke;—and which, if true, would at once cut up by the roots, not only all metaphysicks, but all ethicks, and all religion, both natural and revealed. It is accordingly with this very maxim that Mamdae du Def-

¹ The affection of Gassendi for Hobbes, and his esteem for his writings, are mentioned in very strong terms by Sorbière. “Thomas Hobbius Gassendo charissimus, cujus libellum *De Corpore* paucis ante obitum mensibus accipiens, osculatus est subjungens, *mole quidem parvus est iste liber, verùm totus, ut opinor, medullâ scatet!*” (Sorberii *Pref.*) Gassendi’s admiration of Hobbes’ Treatise *De Cive*, was equally warm; as we learn from a letter of his to Sorbière, prefixed to that work.

² Compare *Gassendi Opera*, Tom. III, p. 300, 301; and Tom. V, p. 12.

land (in a letter which rivals any thing that the fancy of Moliere has conceived in his *Femmes Savantes*) assails Voltaire for his imbecility in attempting a reply to an atheistical book then recently published. In justice to this celebrated lady, I shall transcribe part of it in her own words, as a precious and authentick document of the philosophical tone affected by the higher orders in France, during the reign of Louis XV.

“ J’entends parler d’une refutation d’un certain livre, (*Système de la Nature*.) Je voudrois l’avoir. Je m’en tiens à connoître ce livre par vous. Toutes refutations de système doivent être bonnes, surtout quand c’est vous qui les faites. Mais, mon cher Voltaire, ne vous ennuyez-vous pas de tous les raisonnemens métaphysiques sur les matières inintelligibles. *Peut-on donner des idées, ou peut-on en admettre d’autres que celles que nous recevons par nos sens ?*”—If the Senses be *the beginning and end* of all our knowledge, the inference here pointed at is quite irresistible. ¹

A learned and profound writer has lately complained of the injustice done by the present age to Gassendi; in whose works, he asserts, may be found the whole of the doctrine commonly ascribed to Locke concerning the origin of our knowledge. ² The remark is certainly just,

¹ Notwithstanding the evidence (according to *my* judgment) of this conclusion, I trust it will not be supposed that I impute the slightest bias in its favour to the generality of those who have adopted the premises. If an author is to be held chargeable with all the consequences logically deducible from his opinions, who can hope to escape censure? And, in the present instance, how few are there among Montaigne’s disciples, who have ever reflected for a moment on the real meaning and import of the proverbial maxim in question!

² “ Gassendi fut le premier auteur de la nouvelle philosophie de l’esprit humain; car il est tems de lui rendre, à cet égard, une justice qu’il n’a presque jamais obtenue de ses propres com-

if restricted to Locke's doctrine as interpreted by the greater part of philosophers on the Continent ; but it is very wide of the truth, if applied to it as now explained and modified by the most intelligent of his disciples in this country. The main scope, indeed, of Gassendi's argument against Descartes, is to materialize that class of our ideas which the Lockists as well as the Cartesians consider as the exclusive objects of the power of *reflection* ; and to shew that these ideas are all ultimately resolvable into images or conceptions borrowed from things external. It is not, therefore, what is sound and valuable in this part of Locke's system, but the errors grafted on it in the comments of some of his followers, that can justly be said to have been borrowed from Gassendi. Nor has Gassendi the merit of originality, even in these errors ; for scarcely a remark on the subject occurs in his works, but what is copied from the accounts transmitted to us of the Epicurean metaphysics.

Unfortunately for Descartes, while he so clearly perceived that the origin of those ideas which are the most interesting to human happiness, could not be traced to our external senses, he had the weakness, instead of stating this fundamental proposition in plain and precise terms, to attempt an explanation of it by the extravagant hypothesis of *innate ideas*. This hypothesis gave Gassendi great advantages over him, in the management of their controversy ; while the subsequent adoption of Gassendi's reasonings against it by Locke, has led to a very general but ill founded belief, that the latter, as well as the former,

patriotes. Il est très singulier en effet, qu'en parlant de la nouvelle philosophie de l'esprit humain, nous disions toujours, *la philosophie de Locke*. D'Alembert et Condillac ont autorisé cette expression, en rapportant l'un et l'autre à Locke exclusivement, la gloire de cette invention," &c. &c. *De Gerando, Hist. Comp. des Systèmes*, Tome I, p. 301.

rejected, along with the doctrine of *innate ideas*, the various important and well ascertained truths combined with it in the Cartesian system.

The hypothetical language afterwards introduced by Leibnitz concerning the human soul (which he sometimes calls a *living mirror of the universe*, and sometimes supposes to contain within itself *the seeds* of that knowledge which is gradually unfolded in the progressive exercise of its faculties,) is another impotent attempt to explain a mystery unfathomable by human reason. The same remark may be extended to some of Plato's reveries on this question, more particularly to his supposition, that those ideas which cannot be traced to any of our external senses, were acquired by the soul in its state of preexistence. In all of these theories, as well as in that of Descartes, the cardinal truth is assumed as indisputable, that the Senses *are not* the only sources of human knowledge; nor is any thing wanting to render them correctly logical, but the statement of this truth as an ultimate fact (or at least as a fact hitherto unexplained) in our intellectual frame.

It is very justly observed by Mr. Hume, with respect to Sir Isaac Newton, that "while he seemed to draw off the veil from some of the mysteries of nature, he showed, at the same time, the imperfections of the mechanical philosophy, and thereby restored her ultimate secrets to that obscurity in which they ever did, and ever will remain."¹ When the justness of this remark shall be as universally acknowledged in the science of Mind as it now is in Natural Philosophy, we may reasonably expect that an end will be put to those idle controversies which have so long diverted the attention of Metaphysicians from the proper objects of their studies.

¹ *History of Great Britain*, chap. lxxi.

The text of Scripture, prefixed by Dr. Reid as a motto to his *Inquiry*, conveys, in a few words, the result of his own modest and truly philosophical speculations on the origin of our knowledge, and expresses this result in terms strictly analogous to those in which Newton speaks of the law of gravitation:—" *The inspiration of the Almighty hath given them understanding.*" Let our researches concerning the development of the Mind, and the *occasions* on which its various notions are first formed, be carried back ever so far towards the commencement of its history, in *this* humble confession of human ignorance they must terminate at last.

I have dwelt thus long on the writings of Gassendi, much less from my own idea of their merits, than out of respect to an author, in whose footsteps Locke has frequently condescended to tread. The epigrammatick encomium bestowed on him by Gibbon, who calls him "le meilleur philosophe des litterateurs, et le meilleur litterateur des philosophes," appears to me quite extravagant.¹ His learning, indeed, was at once vast and accurate; and, as a philosopher, he is justly entitled to the praise of being one of the first who entered thoroughly into the spirit of the Baconian logick. But his inventive powers, which were probably not of the highest order, seem to have been either dissipated amidst the multiplicity of his literary pursuits, or laid asleep by his indefatigable labours, as a Commentator and a Compiler. From a writer of this class, new lights were not to be expected in the study of the Human Mind; and accordingly, *here* he has done little or nothing, but to revive and to repeat over the doctrines of the old Epicureans. His works amount to six large volumes in folio; but the substance of them might be compressed into a

¹ *Essai sur l'Etude de la Litterature.*

much smaller compass, without any diminution of their value.

In *one* respect Gassendi had certainly a great advantage over his antagonists—the good humour which never forsook him in the heat of a philosophical argument. The comparative indifference with which he regarded most of the points at issue between them, was perhaps the chief cause of that command of temper so uniformly displayed in all his controversies, and so remarkably contrasted with the constitutional irritability of Descartes. Even the faith of Gassendi in his own favourite master, Epicurus, does not seem to have been very strong or dogmatical, if it be true that he was accustomed to allege, as the chief ground of his preferring the Epicurean physicks, to the theory of the Vortices, “that chimera for chimera, he could not help feeling some partiality for that which was two thousand years older than the other.”¹

About twenty years after the death of Gassendi (who did not long survive Descartes,) Malebranche entered upon his philosophical career. The earlier part of his life had, by the advice of some of his preceptors, been devoted to the study of ecclesiastical history, and of the learned languages; for neither of which pursuits does he seem to have felt that marked predilection which afforded any promise of future eminence. At length, in the twenty-fifth year of his age, he accidentally met with Descartes’ *Treatise on Man*, which opened to him at once a new world, and awakened him to a consciousness of powers, till then unsuspected either by himself or by others. Fontenelle has given a lively picture of the enthusiastick ardour with which Malebranche first read this performance; and describes its effects on his nervous system as sometimes so

¹ See Note Q.

great, that he was forced to lay aside the book till the palpitation of his heart had subsided.

It was only ten years after this occurrence when he published *The Search after Truth*; a work which, whatever judgment may now be passed on its philosophical merits, will always form an interesting study to readers of taste, and a useful one to students of human nature. Few books can be mentioned, combining, in so great a degree, the utmost depth and abstraction of thought, with the most pleasing sallies of imagination and eloquence; and none, where they who delight in the observation of intellectual character may find more ample illustrations, both of the strength and weakness of the human understanding. It is a singular feature in the history of Malebranche, that, notwithstanding the poetical colouring which adds so much animation and grace to his style, he never could read, without disgust, a page of the finest verses;¹ and that, although Imagination was manifestly the predominant ingredient in the composition of his own genius, the most elaborate passages in his works are those where he inveighs against this treacherous faculty, as the prolifick parent of our most fatal delusions.²

In addition to the errors, more or less incident to all men, from the unresisted sway of imagination during the infancy

¹ Bayle.—Fontenelle.—D'Alembert.

² In one of his arguments on this head, Malebranche refers to the remarks previously made on the same subject by an English philosopher, who, like himself, has more than once taken occasion, while warning his readers against the undue influence of imagination over the judgment, to exemplify the boundless fertility and originality of his own. The following allusion of Bacon's, quoted by Malebranche, is eminently apposite and happy: "Omnes perceptiones tam sensus quam mentis sunt ex analogia hominis, non ex analogia universi: Estque intellectus humanus instar speculi inaequalis ad radios rerum, qui suam naturam naturae rerum immiscet, eamque distorquet et inficit."

of reason, Malebranche had, in his own case, to struggle with all the prejudices connected with the peculiar dogmas of the Roman Catholick faith. Unfortunately, too, he every where discovers a strong disposition to blend his theology and his metaphysics together; availing himself of the one as an auxiliary to the other, wherever, in either science, his ingenuity fails him in establishing a favourite conclusion. To this cause is chiefly to be ascribed the little attention now paid to a writer formerly so universally admired, and, in point of fact, the indisputable author of some of the most refined speculations claimed by the theorists of the eighteenth century. As for those mystical controversies about *Grace* with Anthony Arnauld, on which he wasted so much of his genius, they have long sunk into utter oblivion; nor should I have here revived the recollection of them, were it not for the authentick record they furnish of the passive bondage in which, little more than a hundred years ago, two of the most powerful minds of that memorable period were held by a creed, renounced, at the Reformation, by all the Protestant countries of Europe; and the fruitful source, wherever it has been retained, of other prejudices, not less to be lamented, of an opposite description.¹

¹ Of this disposition to blend theological dogmas with philosophical discussions, Malebranche was so little conscious in himself, that he has seriously warned his readers against it, by quoting an aphorism of Bacon's, peculiarly applicable to his own writings: "*Ex divinorum et humanorum malesana admixtione non solum educitur philosophia phantastica, sed etiam religio haeretica. Itaque salutare admodum est si mente sobria fidei tantum dentur quae fidei sunt.*" In transcribing these words, it is amusing to observe, that Malebranche has silyly suppressed the name of the author from whom they are borrowed; manifestly from an unwillingness to weaken their effect, by the suspicious authority of a philosopher not in communion with the Church of Rome. *Recherche de la Vérité*, Liv. ii, chap. ix.

Dr. Reid, proceeding on the supposition that Malebranche was a Jesuit, has ascribed to the antipathy between this order

When Malebranche touches on questions not positively decided by the church, he exhibits a remarkable boldness and freedom of inquiry ; setting at nought those human authorities which have so much weight with men of unenlightened erudition ; and sturdily opposing his own reason to the most inveterate prejudices of his age. His disbelief in the reality of sorcery, which, although cautiously expressed, seems to have been complete, affords a decisive proof of the soundness of his judgment, where he conceived himself to have any latitude in exercising it. The following sentences contain more good sense on the subject, than I recollect in any contemporary author. I shall quote them, as well as the other passages I may afterwards extract from his writings, in his own words, to which it is seldom possible to do justice in an English version.

“ Les hommes même les plus sages se conduisent plutôt par l’imagination des autres, je veux dire par l’opinion et par la coutume, que par les regles de la raison. Ainsi dans les lieux où l’on brûle les sorciers, on ne voit autre chose, parce que dans les lieux où l’on les condamne au feu, on croit véritablement qu’ils le sont, et cette croyance se fortifie par les discours qu’on en tient. Que l’on cesse de les punir et qu’on les traite comme des fous, et l’on verra qu’avec le tems ils ne seront plus sorciers ; parce que ceux qui ne le sont que par imagination, qui font certainement le plus grand nombre, deviendront comme les autres hommes.

“ C’est donc avec raison que plusieurs Parlemens ne punissent point les sorcières : ils s’en trouve beaucoup moins

and the Jansenists, the warmth displayed on both sides, in his disputes with Arnauld (*Essays on the Int. Powers*, p. 124 ;) but the fact is, that Malebranche belonged to the Congregation of the *Oratory* ; a society much more nearly allied to the Jansenists than to the Jesuits ; and honourably distinguished, since its first origin, by the moderation as well as learning of its members.

dans les terres de leur ressort : Et l'envie, la haine, et la malice des méchans ne peuvent se servir de ce prétexte pour accabler les innocens."

How strikingly has the sagacity of these anticipations and reflections been verified, by the subsequent history of this popular superstition in our own country, and indeed in every other instance where the experiment recommended by Malebranche has been tried! Of this sagacity much must, no doubt, be ascribed to the native vigour of a mind struggling against and controlling early prejudices; but it must not be forgotten, that, notwithstanding his retired and monastick life, Malebranche had breathed the same air with the associates and friends of Descartes and of Gassendi; and that no philosopher seems ever to have been more deeply impressed with the truth of that golden maxim of Montaigne—"Il est bon de frotter et limer notre cervelle contre celle d'autrui."

Another feature in the intellectual character of Malebranche, presenting an unexpected contrast to his powers of abstract meditation, is the attentive and discriminating eye with which he appears to have surveyed the habits and manners of the comparatively little circle around him; and the delicate yet expressive touches with which he has marked and defined some of the nicest shades and varieties of genius.¹ To this branch of the Philosophy of Mind, not certainly the least important and interesting, he has contributed a greater number of original remarks than Locke himself;²—since whose time, with the single exception of

¹ See among other passages, *Rech. de la Vérité*, Liv. ii, chap. ix.

² In one of Locke's most noted remarks of this sort, he has been anticipated by Malebranche, on whose clear yet concise statement he does not seem to have thrown much new light by his very diffuse and wordy commentary. "If in having our ideas

Helvetius, hardly any attention has been paid to it, either by French or English metaphysicians. The same practical knowledge of the human understanding, modified and

in the memory ready at hand, consists quickness of parts; in this of having them unconfused, and being able nicely to distinguish one thing from another, where there is but the least difference, consists, in a great measure, the exactness of judgment and clearness of reason, which is to be observed in one man above another. And hence, perhaps, may be given some reason of that common observation, that men who have a great deal of wit, and prompt memories, have not always the clearest judgment, or deepest reason. For Wit, lying most in the assemblage of ideas, and putting those together with quickness and variety, *whercin* can be found any resemblance or congruity, *thereby* to make up pleasant pictures, and agreeable visions in the fancy; Judgment, on the contrary, lies quite on the other side, in separating carefully, one from another, ideas *whercin* can be found the least difference, *thereby* to avoid being misled by similitude, and by affinity to take one thing for another." *Essay, &c.* B. ii, c. xi, § 2.

"Il y a donc des esprits de deux sortes. Les uns remarquent aisément les différences des choses, et ce sont les bons esprits. Les autres imaginent et supposent de la ressemblance entr'elles, et ce sont les esprits superficiels." *Rech. de la Vérité.* Liv. ii. *Seconde Partie*, chap. ix.

At a still earlier period, Bacon had pointed out the same cardinal distinction in the intellectual characters of individuals.

"Maximum et velut radicale discrimen ingeniorum, quoad philosophiam et scientias, illud est; quod alia ingenia sint fortiora et aptiora ad notandas rerum differentias; alia, ad notandas rerum similitudines. Ingenia enim constantia et acuta, figere contemplationes, et morari, et haerere in omni subtilitate differentiarum possunt. Ingenia autem sublimia, et discursiva, etiam tenuissimas et catholicas rerum similitudines et cognoscunt, et componunt. Utrumque autem ingenium facile labitur in excessum, prensando aut gradus rerum, aut umbras."

That strain I heard was of a higher mood! It is evident, that Bacon has here seized, in its most general form, the very important truth perceived by his two ingenious successors in particular cases. *Wit*, which Locke contrasts with *judgment*, is only one of the various talents connected with what Bacon calls the *discursive genius*; and indeed, a talent very subordinate in dignity to most of the others.

diversified, as we every where see it, by education and external circumstances, is occasionally discovered by his very able antagonist Arnauld; affording, in both cases, a satisfactory proof, that the narrowest field of experience may disclose to a superiour mind those refined and comprehensive results, which common observers are forced to collect from an extensive and varied commerce with the world.

In some of Malebranche's incidental strictures on men and manners, there is a lightness of style and fineness of *tact*, which one would scarcely have expected from the mystical divine, who believed that *he saw all things in God*. Who would suppose that the following paragraph forms part of a profound argument on the influence of the external senses over the human intellect?

“ Si par exemple, celui qui parle s'énonce avec facilité, s'il garde une mesure agréable dans ses périodes, s'il a l'air d'un honnête homme et d'un homme d'esprit, si c'est une personne de qualité, s'il est suivi d'un grand train, s'il parle avec autorité et avec gravité, si les autres l'écoutent avec respect et en silence, s'il a quelque réputation, et quelque commerce avec les esprits du premier ordre, enfin, s'il est assez heureux pour plaire, ou pour être estimé, il aura raison dans tout ce qu'il avancera; et il n'y aura pas jusqu'à son collet et à ses manchettes, qui ne prouvent quelque chose.”¹

¹ I shall indulge myself only in one other citation from Malebranche, which I select partly on account of the curious extract it contains from an English publication long since forgotten in this country; and partly as a proof that this learned and pious father was not altogether insensible to the ludicrous.

“ Un illustre entre les Scavans, qui a fondé des chaires de Géometrie et d'Astronomie dans l'Université d'Oxford,* com-

* Sir Henry Savile. The work here referred to is a 4to volume, entitled. *Prelectiones xiii. in Principium Elementorum Euclidis*, Oxoniae habitae, Anno, 1620.

In his philosophical capacity, Malebranche is to be considered in two points of view: 1, As a commentator on Descartes; and, 2, As the author of some conclusions from the Cartesian principles, not perceived or not avowed by his predecessors of the same school.

mence un livre, qu'il s'est avisé de faire sur les huit premières propositions d'Euclide, par ces paroles. *Consilium meum est, auditores, si vires et valetudo suffecerint, explicare definitiones, petitiones, communes sententias, et octo priores propositiones primi libri clementorum, caetera post me venientibus relinquere*: et il le finit par celles-ci: *Exsolvi, per Dei gratiam, Domini auditores, promissum, liberavi fidem meam, explicavi pro modulo meo definitiones, petitiones, communes sententias, et octo priores propositiones clementorum Euclidis. Hic annis fessus cyclos artemque repono. Succedent in hoc munus alii fortasse magis vegeto corpore et vivido ingenio*. Il ne faut pas une heure à un esprit mediocre, pour apprendre par lui même, ou par le secours du plus petit géometre qu'il y ait, les definitions, demandes, axiomes, et les huit premières propositions d'Euclide: et voici un auteur qui parle de cette entreprise, comme de quelque chose de fort grand, et de fort difficile. Il a peur que les forces lui manquent; *Si vires et valetudo suffecerint*. Il laisse à ses successeurs à pousser ces choses: *caetera post me venientibus relinquere*. Il remercie Dieu de ce que, par une grace particulière, il a exécuté ce qu'il avoit promis: *exsolvi, per Dei gratiam, promissum, liberavi fidem meam, explicavi pro modulo meo*. Quoi? la quadrature du cercle? la duplication du cube? Ce grand homme a expliqué *pro modulo suo*, les definitions, les demandes, les axiomes, et les huit premières propositions du premier livre des *Elemens* d'Euclide. Peut-être qu'entre ceux qui lui succederont, il s'en trouvera qui auront plus de santé, et plus de force que lui pour continuer ce bel ouvrage: *Succedent in hoc munus alii FORTASSE magis vegeto corpore, et vivido ingenio*. Mais pour lui il est tems qu'il se repose; *hic annis fessus cyclos artemque repono*."

After reading the above passage, it is impossible to avoid reflecting, with satisfaction, on the effect which the progress of philosophy has since had, in removing those obstacles to the acquisition of useful knowledge, which were created by the pedantick taste prevalent two centuries ago. What a contrast to a quarto commentary on the definitions, postulates, axioms, and first eight propositions of Euclid's First Book, is presented by Condorcet's estimate of the time now sufficient to conduct a student to the highest branches of mathematicks! "Dans le siècle dernier, il

1. I have already taken notice of Malebranche's comments on the Cartesian doctrine concerning the *sensible*, or, as they are now more commonly called, *the secondary qualities* of matter. The same fulness and happiness of illustration are every where else to be found in his elucidations of his master's system; to the popularity of which he certainly contributed greatly by the liveliness of his fancy, and the charms of his composition. Even in *this* part of his writings, he always preserves the air of an original thinker; and, while pursuing the same path with Descartes, seems rather to have accidentally struck into it from his own casual choice, than to have selected it out of any deference for the judgment of another. Perhaps it may be doubted, if it is not on such occasions, that the inventive powers of his genius, by being somewhat restrained and guided in their aim, are most vigorously and most usefully displayed.

In confirmation of this last remark, I shall only mention, by way of examples, his comments on the Cartesian theory of Vision,—more especially on that part of it which relates to our experimental estimates of the distances and magnitudes of objects; and his admirable illustration of the errors to which we are liable from the illusions of sense, of imagination, and of the passions. In his physiological reveries on the union of soul and body, he wanders, like his master, in the dark, from the total want of facts as a

suffisoit de quelques années d'étude pour savoir tout ce qu'Archimede et Hipparque avoient pu connoître; et aujourd'hui deux années de l'enseignement d'un professeur vont au dela de ce que savoient Leibnitz ou Newton." (*Sur l'Instruction Publique.*) In this particular science, I am aware that much is to be ascribed to the subsequent invention of new and more general *methods*; but, I apprehend, not a little also to the improvements gradually suggested by experience, in what Bacon calls the *traditive* part of logick.

foundation for his reasonings ; but even here his genius has had no inconsiderable influence on the inquiries of later writers. The fundamental principle of Hartley is most explicitly stated in *The Search after Truth* ;¹ as well as a hypothesis concerning the nature of *habits*, which, rash and unwarranted as it must now appear to every novice in science, was not thought unworthy of adoption in *The Essay on Human Understanding*.²

¹ “ Toutes nos différentes perceptions sont attachées aux différens changemens qui arrivent dans les fibres de la partie principale du cerveau dans laquelle l'ame réside plus particulièrement.” (*Rech. de la Vérité*, Liv. ii, chap. v.) These *changes* in the fibres of the brain are commonly called by Malebranche *ebranlemens* ;—a word which is frequently rendered by his old English translator (Taylor) *vibrations*. “ La seconde chose,” says Malebranche, “ qui se trouve dans chacune des sensations, est *l'ebranlement* des fibres de nos nerfs, qui se communique jusqu'au cerveau :” thus translated by Taylor: “ The second thing that occurs in every sensation is the *vibration* of the fibres of our nerves, which is communicated to the brain.” (Liv. i, chap. xii.) Nor was the theory of *association* overlooked by Malebranche. See, in particular, the third chapter of his second book, entitled, *De la liaison mutuelle des idées de l'esprit, et des traces du cerveau ; et de la liaison mutuelle des traces avec les traces, et des idées avec les idées*.

² “ Mais afin de suivre nôtre explication, il faut remarquer que les esprits ne trouvent pas toujours les chemins, par où ils doivent passer, assez ouverts et assez libres ; et que cela fait qui nous avons de la difficulté à remuer, par exemple, les doigts avec la vitesse qui est nécessaire pour jouer des instrumens de musique, ou les muscles qui servent à la prononciation, pour prononcer les mots d'une langue étrangere : Mais que peu-a-peu *les esprits animaux par leur cours continuel ouvrent et applanissent ces chemins*, en sorte qu'avec le tems ils n'y trouvent plus de résistance. Car c'est dans cette facilité que les esprits animaux ont de passer dans les membres de nôtre corps, que consistent les habitudes.” *Rech. de la Vérité*, Liv. ii, chap. v.

“ Habits seem to be but trains of motion in the animal spirits, which, once set a-going, continue in the same steps they have been used to, *which, by often treading, are worn into a smooth path*.” Locke, Book ii, chap. xxxiii, § 6.

2, Among the opinions which chiefly characterize the system of Malebranche, the leading one is, that the *causes* which it is the aim of philosophy to investigate are only *occasional causes*; and that the Deity is himself the *efficient* and the *immediate cause* of every effect in the universe.¹ From this single principle, the greater part of his distinguishing doctrines may be easily deduced, as obvious corollaries.

That we are completely ignorant of the manner in which *physical causes* and *effects* are connected, and that all our knowledge concerning them amounts merely to a perception of *constant conjunction*, had been before remarked by Hobbes, and more fully shown by Glanville in his *Scepsis Scientifica*. Malebranche, however, has treated the same argument much more profoundly and ably than any of his predecessors, and has, indeed, anticipated Hume in some of the most ingenious reasonings contained in his *Essay on Necessary Connexion*. From these *data*, it was not unnatural for his pious mind to conclude, that what are commonly called *second causes* have no existence; and that the Divine power, incessantly and universally exerted, is, in truth, the connecting link of all the phenomena of nature. It is obvious, that, in this conclusion, he went farther than his premises warranted; for, although no necessary connexions among physical events can be traced by our faculties, it does not therefore follow that such connexions are impossible. The only sound inference was, that the laws of nature are to be discovered, *not*, as the ancients supposed,

² “ Afin qu’on ne puisse plus douter de la fausseté de cette miserable philosophie, il est nécessaire de prouver qu’il n’y a qu’un vrai Dieu, parce qu’il n’y a qu’une vraie cause; que la nature ou la force de chaque chose n’est que la volonté de Dieu: que toutes les causes naturelles ne sont point de véritable causes, mais seulement des causes occasionelles.” *De la Vérité*, Livre vi. 2de Partie, chap. iii.

by *a priori* reasonings from causes to effects, but by experience and observation. It is but justice to Malebranche to own, that he was one of the first who placed in a just and strong light this fundamental principle of the inductive logick.

On the other hand, the objections to the theory of *occasional causes*, chiefly insisted on by Malebranche's opponents, were far from satisfactory. By some it was alleged, that it ascribed every event to a miraculous interposition of the Deity ; as if this objection were not directly met by the general and constant *laws* every where manifested to our senses,—in a departure from which laws, the very essence of a *miracle* consists. Nor was it more to the purpose to contend, that the beauty and perfection of the universe were degraded by excluding the idea of *mechanism* ; the whole of this argument turning, as is manifest, upon an application to Omnipotence of ideas borrowed from the limited sphere of human power.¹ As to the study of natural philosophy, it is plainly not at all affected by the hypothesis in question ; as the investigation and generalization of the laws of nature, which are its only proper objects, present exactly the same field to our curiosity, whether we suppose these *laws* to be the immediate effects of the Di-

¹ This objection, frivolous as it is, was strongly urged by Mr. Boyle (*Inquiry into the Vulgar Idea concerning Nature*,) and has been copied from him by Mr. Hume, Lord Kames, and many other writers. Mr. Hume's words are these: "It argues more wisdom to contrive at first the fabrick of the world with such perfect foresight, that, of itself, and by its proper operation, it may serve all the purposes of providence, than if the great Creator were obliged every moment to adjust its parts, and animate by his breath all the wheels of that stupendous machine." (*Essay on the Idea of necessary Connexion*.) An observation somewhat similar occurs in the Treatise *De Mundo*, commonly ascribed to Aristotle.

vine agency, or the effects of *second causes*, placed beyond the reach of our faculties.¹

Such, however, were the chief reasonings opposed to Malebranche by Leibnitz, in order to prepare the way for the system of *Preestablished Harmony*; a system more nearly allied to that of *occasional causes* than its author seems to have suspected, and encumbered with every solid difficulty connected with the other.

From the theory of *occasional causes*, it is easy to trace the process which led Malebranche to conclude, *that we see all things in God*. The same arguments which convinced him, that the Deity carries into execution every *volition* of the mind, in the movements of the body, could not fail to suggest, as a farther consequence, that every *perception* of the mind in the immediate effect of the divine illumination. As to the *manner* in which this illumination is accomplished, the extraordinary hypothesis adopted by Malebranche was forced upon him, by the opinion then univer-

¹ In speaking of the theory of *occasional causes*, Mr. Hume has committed a historical mistake, which it may be proper to rectify. "Malebranche," he observes, "and other Cartesians, made the doctrine of the universal and sole efficacy of the Deity, the foundation of all their philosophy. *It had, however, no authority in England*. Locke, Clarke, and Cudworth, never so much as take notice of it, but suppose all along that matter has a real, though subordinate and derived power." *Hume's Essays*, vol. II, p. 475. edit. of 1784.

Mr. Hume was probably led to connect, in this last sentence, the name of Clarke with those of Locke and Cudworth, by taking for granted that his metaphysical opinions agreed exactly with those commonly ascribed to Sir Isaac Newton. In fact, on the point now in question, his creed was the same with that of Malebranche. The following sentence is very nearly a translation of a passage already quoted from the latter. "The course of nature, truly and properly speaking, is nothing but the will of God producing certain effects in a continued, regular, constant, and uniform manner." *Clarke's Works*, vol. II, p. 693. fol. ed.

sally held, that the immediate objects of our perceptions are not things external, but their *ideas* or images. The only possible expedient for reconciling these two articles of his creed, was to transfer the seat of our *ideas* from our own minds to that of the Creator.¹

In this theory of Malebranche, there is undoubtedly, as Bayle has remarked,² an approach to some speculations of the latter Platonists; but there is a much closer coincidence between it and the system of those Hindoo philosophers, who (according to Sir William Jones) “believed that the whole creation was rather an *energy* than a *work*; by which the infinite Mind, who is present at all times, and in all places, exhibits to his creatures a set of perceptions, like a wonderful picture, or piece of musick, always varied, yet always uniform.”³

In some of Malebranche’s reasonings upon this subject, he has struck into the same train of thought which was afterwards pursued by Berkeley (an author to whom he bore a very strong resemblance in some of the most characteristic features of his genius;) and, had he not been restrained by religious scruples, he would, in all probability, have asserted, not less confidently than his successor, that the existence of matter was demonstrably inconsistent with the principles then universally admitted by philosophers. But this conclusion Malebranche rejects, as not reconcilable with the words of Scripture, that “in the beginning God created the heavens and the earth.” “La foi m’ap-

¹ We are indebted to La Harpe for the preservation of an epigrammatick line (*un vers fort plaisant*, as he justly calls it) on this celebrated hypothesis: “*Lui, qui voit tout en Dieu, n’y voit-il pas qu’il est fou?*—C’étoit au moins,” La Harpe adds, “un fou qui avoit beaucoup d’esprit.”

² See his Dictionary, article *Amelius*.

³ Introduction to a Translation of some Hindoo verses.

prend que Dieu a crée le ciel et la terre. Elle m'apprend que l'Ecriture est un livre divin. Et ce livre ou son apparence me dit nettement et positivement, qu'il y a mille et mille creatures. Donc voilà toutes mes apparences changées en réalités. Il y a des corps; cela est démontré en toute rigueur la foy supposée."¹

In reflecting on the repeated reproduction of these, and other ancient paradoxes, by modern authors, whom it would be highly unjust to accuse of plagiarism;—still more, in reflecting on the affinity of some of our most refined theories to the popular belief in a remote quarter of the globe, one is almost tempted to suppose, that human invention is limited, like a barrel-organ, to a specifick number of tunes. But is it not a fairer inference, that the province of pure Imagination, unbounded as it may at first appear, is narrow, when compared with the regions opened by truth and nature to our powers of observation and reasoning?² Prior to the time of Bacon, the physical systems of the learned performed their periodical revolutions in orbits as small as the metaphysical hypothesis of their successors; and yet, who

¹ *Entretiens sur la Metaphysique*, p. 207.

The celebrated *doubt* of Descartes concerning all truths but the existence of his own *mind* (it cannot be too often repeated,) was the real source, not only of the inconsistency of Malebranche on this head, but of the chief metaphysical *puzzles* afterwards started by Berkeley and Hume. The illogical transition by which he attempted to pass from this first principle to other truths, was early remarked by some of his own followers, who were accordingly led to conclude, that no man can have full assurance of any thing but of his own individual existence. If the fundamental doubt of Descartes be admitted as reasonable, the conclusion of these philosophers (who were distinguished by the name of *Egoists*,) is unavoidable.

² The limited number of fables, of humorous tales, and even of jests, which, it should seem, are in circulation over the face of the globe, might perhaps be alleged as an additional confirmation of this idea.

would now set any bounds to our curiosity in the study of the material universe? Is it reasonable to think, that the phenomena of the intellectual world are less various, or less marked with the signatures of Divine wisdom?

It forms an interesting circumstance in the history of the two memorable persons who have suggested these remarks, that they had *once*, and only *once*, the pleasure of a short interview. “The conversation,” we are told, “turned on the nonexistence of matter. Malebranche, who had an inflammation in his lungs, and whom Berkeley found preparing a medicine in his cell, and cooking it in a small pipkin, exerted his voice so violently in the heat of their dispute, that he increased his disorder, which carried him off a few days after.”¹ It is impossible not to regret, that of this interview there is no other record;—or rather, that Berkeley had not made it the groundwork of one of his own dialogues. Fine as his imagination was, it could scarcely have added to the picturesque effect of the real scene.²

¹ *Biog. Brit.* vol. II, p. 251.

² This interview happened in 1715, when Berkeley was in the thirty-first, and Malebranche in the seventy-seventh year of his age. What a change in the state of the philosophical world (whether for the better or worse is a different question) has taken place in the course of the intervening century!

Dr. Warburton, who, even when he thinks the most unsoundly, always possesses the rare merit of thinking for himself, is one of the very few English authors who have spoken of Malebranche with the respect due to his extraordinary talents. “All you say of Malebranche,” he observes in a letter to Dr. Hurd, “is strictly true; he is an admirable writer. There is something very different in the fortune of Malebranche and Locke. When Malebranche first appeared, it was with a general applause and admiration; when Locke first published his *Essay*, he had hardly a single approver. Now Locke is universal, and Malebranche sunk into obscurity. All this may be easily accounted for. The intrinsic merit of either was out of the question. But Malebranche supported his first appearance on a philosophy in the highest vogue; that philosophy has been overturned by the New-

Anthony Arnauld, whom I have already mentioned as one of the theological antagonists of Malebranche, is also entitled to a distinguished rank among the French philosophers of this period. In his book *on true and false ideas*, written in opposition to Malebranche's scheme of our seeing all things in God, he is acknowledged by Dr. Reid to have struck the first mortal blow at the *ideal theory*; and to have approximated very nearly to his own refutation of this ancient and inveterate prejudice.¹ A step so important

tonian, and Malebranche has fallen with his master. It was to no purpose to tell the world, that Malebranche could stand without him. The publick never examines so narrowly. Not but that there was another cause sufficient to do the business; and that is, his debasing his noble work with his system of seeing all things in God. When this happens to a great author, one half of his readers out of folly, the other out of malice, dwell only on the unsound part, and forget the other, or use all their arts to have it forgotten.

“ But the sage Locke supported himself by no system on the one hand; nor, on the other, did he dishonour himself by any whimsies. The consequence of which was, that, neither following the fashion, nor striking the imagination, he, at first, had neither followers nor admirers; but being every where clear, and every where solid, he at length worked his way, and afterwards was subject to no reverses. He was not affected by the new fashions in philosophy, who leaned upon none of the old; nor did he afford ground for the after attacks of envy and folly by any fanciful hypothesis which, when grown stale, are the most nauseous of all things.”

The foregoing reflections on the opposite fates of these two philosophers, do honour on the whole to Warburton's penetration; but the unqualified panegyrick on Locke will be now very generally allowed to furnish an additional example of “ that national spirit, which,” according to Hume, “ forms the great happiness of the English, and leads them to bestow on all their eminent writers such praises and acclamations, as may often appear partial and excessive.”

¹ The following very concise and accurate summary of Arnauld's doctrine concerning *ideas*, is given by Brucker. “ Antonius Arnaldus, ut argumenta Malebranchii eo fortius everteret, peculiarem sententiam defendit, asseruitque, ideas earumque perceptiones esse unum idemque, et non nisi relationibus differre. Ideam scilicet esse, quatenus ad objectum refertur quod mens

would, of itself, be sufficient to establish his claim to a place in literary history ; but what chiefly induces me again to bring forward his name, is the reputation he has so justly acquired by his treatise, entitled *the Art of Thinking* ;¹ a treatise written by Arnauld, in conjunction with his friend Nicole, and of which (considering the time when it appeared) it is hardly possible to estimate the merits too highly. No publication certainly, prior to Locke's *Essay*, can be named, containing so much good sense, and so little nonsense on the science of Logick ; and very few have since appeared on the same subject, which can be justly preferred to it, in point of practical utility. If the author had lived in the present age, or had been less fettered by a prudent regard to existing prejudices, the technical part would probably have been reduced within a still narrower compass. But, even there, he has contrived to substitute for the puerile and contemptible examples of common logicians, several interesting illustrations from the physical discoveries of his immediate predecessors ; and has indulged himself in some short excursions, which excite a lively regret that he had not, more frequently and freely, given scope to his original reflections. Among these excursions, the most valuable, in my opinion, is the twentieth chapter of the third part, which deserves the attention of every logical student, as an important and instructive supplement to the enumeration of sophisms given by Aristotle.²

considerat ; perceptionem vero, quatenus ad ipsam mentem quae percipit ; duplicem tamen illam relationem ad unam pertinere mentis modificationem." *Hist. Phil. de Ideis*, pp. 247, 248.

¹ More commonly known by the name of the *Port Royal Logick*.

² According to Crousaz, *The Art of Thinking* contributed more than either the *Organon* of Bacon, or the *Method* of Descartes, to improve the established modes of academical education on the Continent. (See the preface to his *Logick*, printed at Geneva

The soundness of judgment, so eminently displayed in the *Art of Thinking*, forms a curious contrast to that passion for theological controversy, and that zeal for what he conceived to be the purity of the Faith, which seem to have been the ruling passions of the author's mind. He lived to the age of eighty-three, continuing to write against Malebranche's opinions concerning *Nature and Grace*, to his last hour. "He died," says his biographer, "in an obscure retreat at Brussels, in 1692, without fortune, and even without the comfort of a servant; he, whose nephew had been a Minister of State, and who might himself have been a Cardinal. The pleasure of being able to *publish* his sentiments, was to him a sufficient recompense." Nicole, his friend and companion in arms, worn out at length with these incessant disputes, expressed a wish to retire from the field,

1724.) Leibnitz himself has mentioned it in the most flattering terms; coupling the name of the author with that of Pascal, a still more illustrious ornament of the *Port Royal* Society:—*Ingeniosissimus Pascalius in praeclara dissertatione de ingenio Geometrico, cujus fragmentum extat in egregio libro celeberrimi viri Antonii Arnaldi de Arte bene Cogitandi,*" &c.; but lest this encomium from so high an authority should excite a curiosity somewhat out of proportion to the real value of the two works here mentioned, I think it right to add, that the praises bestowed by Leibnitz, whether on living or dead authors, are not always to be strictly and literally interpreted. "No one," says Hume, "is so liable to an excess of admiration as a truly great genius." Wherever Leibnitz has occasion to refer to any work of solid merit, this remark applies to him with peculiar force; partly, it is probable, from his quick and sympathetick perception of congenial excellence, and partly from a generous anxiety to point it out to the notice of the world. It affords, on the other hand, a remarkable illustration of the force of prejudice, that Buffier, a learned and most able Jesuit, should have been so far influenced by the hatred of his order to the Jansenists, as to distinguish the *Port Royal Logick* with a cold approbation of being "a judicious compilation from former works on the same subject;—particularly from a treatise by a Spanish Jesuit, *Fonséca.*" *Cours De Sciences*, p. 873. Paris 1732.

and to enjoy repose. “*Repose!*” replied Arnauld; “won’t you have the whole of eternity to repose in?”

An anecdote which is told of his infancy, when considered in connexion with his subsequent life, affords a good illustration of the force of impressions received in the first dawn of reason. He was amusing himself one day with some childish sport, in the library of the Cardinal du Peron, when he requested of the Cardinal to give him a pen:—And for what purpose, said the Cardinal?—To write books, like you, against the Huguenots. The Cardinal, it is added, who was then old and infirm, could not conceal his joy at the prospect of so hopeful a successor; and, as he was putting the pen into his hand, said, “I give it to *you*, as the dying shepherd Damocetas bequeathed his pipe to the little Corydon.”

The name of Pascal (*that prodigy of parts*, as Locke calls him) is more familiar to modern ears, than that of any of the other learned and polished anchorites, who have rendered the sanctuary of *Port Royal* so illustrious; but his writings furnish few materials for philosophical history. Abstracting from his great merits in mathematicks and in physicks, his reputation rests chiefly on the *Provincial Letters*; a work from which Voltaire, notwithstanding his strong prejudices against the author, dates the *fixation* of the French language; and of which the same excellent judge has said, that “Molière’s best comedies do not excel them in wit, nor the compositions of Bossuet in sublimity.” The enthusiastick admiration of Gibbon for this book, which he was accustomed from his youth to read once a year, is well known; and is sufficient to account for the rapture with which it never fails to be spoken of by *the erudite vulgar*¹ in this country. I cannot help, however,

¹ *Eruditum Vulgus*. Plin. Nat. Hist. Lib. ii.

suspecting, that it is now more praised than read in Great Britain; so completely have those disputes, to which it owed its first celebrity, lost their interest. Many passages in it, indeed, will always be perused with delight; but it may be questioned, if Gibbon himself would have read it so often from beginning to end, had it not been for the strong hold which ecclesiastical controversies, and the Roman Catholick faith, had early taken of his mind.

In one respect, the *Provincial Letters* are well entitled to the attention of philosophers; inasmuch as they present so faithful and lively a picture of the influence of false religious views in perverting the moral sentiments of mankind. The overwhelming ridicule lavished by Pascal on the whole system of jesuitical casuistry, and the happy effects of his pleasantry in preparing, from a distance, the fall of that formidable order, might be quoted as proofs, that there are at least *some* truths, in whose defence this weapon may be safely employed;—perhaps with *more* advantage than the commanding voice of Reason herself. The mischievous absurdities which it was his aim to correct, scarcely admitted of the gravity of logical discussion; requiring only the extirpation or the prevention of those early prejudices which choke the growth of common sense and of conscience: and for this purpose, what so likely to succeed with the open and generous minds of youth, as Ridicule, managed with decency and taste; more especially when seconded, as in the *Provincial Letters*, by acuteness of argument, and by the powerful eloquence of the heart? In this point of view, few practical moralists can boast of having rendered a more important service than Pascal to the general interests of humanity. Were it not, indeed, for his exquisite satire, we should already be tempted to doubt, if, at so recent a date, it were possible

for such extravagancies to have maintained a dangerous ascendant over the human understanding.

The unconnected fragment of Pascal, entitled *Thoughts on Religion*, contains various reflections which are equally just and ingenious; some which are truly sublime; and not a few which are false and puerile: the whole, however, deeply tinctured with that ascetick and morbid melancholy, which seems to have at last produced a partial eclipse of his faculties. Voltaire has animadverted on this fragment with much levity and petulance; mingling, at the same time, with many very exceptionable strictures, several of which it is impossible to dispute the justness. The following reflection is worthy of Addison; and bears a strong resemblance in its spirit to the amiable lessons inculcated in his papers on Cheerfulness: "To consider the world as a dungeon, and the whole human race as so many criminals doomed to execution, is the idea of an enthusiast; to suppose the world to be a seat of delight, where we are to expect nothing but pleasure, is the dream of a Sybarite; but to conclude that the Earth, Man, and the lower Animals, are, all of them, subservient to the purposes of an unerring Providence, is, in my opinion, the system of a wise and good man."

From the sad history of this great and excellent person (on whose deep superstitious gloom it is the more painful to dwell, that, by an unaccountable, though not singular coincidence, it was occasionally brightened by the inoffensive play of a lively and sportive fancy,) the eye turns with pleasure to repose on the *mitis sapientia*, and the Elysian imagination of Fenelon. The interval between the deaths of these two writers is indeed considerable; but that between their births does not amount to thirty years;

Spectator, No. 381 and 387.

and, in point of education, both enjoyed nearly the same advantages.

The reputation of Fenelon as a philosopher would probably have been higher and more universal than it is, if he had not added to the depth, comprehension, and soundness of his judgment, so rich a variety of those more pleasing and attractive qualities, which are commonly regarded rather as the flowers than the fruits of study. The same remark may be extended to the Fenelon of England, whose ingenious and original essays on the *Pleasures of Imagination* would have been much more valued by modern metaphysicians, had they been less beautifully and happily written. The characteristical excellence, however, of the Archbishop of Cambray, is that *moral wisdom* which (as Shaftesbury has well observed) “comes more from the heart than from the head;” and which seems to depend less on the reach of our reasoning powers, than on the absence of those narrow and malignant passions, which, on all questions of ethicks and politicks (perhaps I might add of religion also,) are the chief source of our speculative errors.

The *Adventures of Telemachus*, when considered as a production of the seventeenth century, and still more as the work of a Roman Catholick Bishop, is a sort of prodigy; and it may, to this day, be confidently recommended, as the best manual extant, for impressing on the minds of youth the leading truths, both of practical morals and of political economy. Nor ought it to be concluded, because these truths appear to lie so near the surface, and command so immediately the cordial assent of the understanding, that they are therefore obvious or tritcal; for the case is the same with *all* the truths most essential to human happiness. The importance of agriculture and of religious toleration to the prosperity of states; the criminal impoli-

cy of thwarting the kind arrangements of Providence, by restraints upon commerce ; and the duty of legislators to study the laws of the moral world as the groundwork and standard of their own, appear, to minds unsophisticated by inveterate prejudices, as approaching nearly to the class of axioms ;—yet, how much ingenious and refined discussion has been employed, even in our own times, to combat the prejudices which every where continue to struggle against them ; and how remote does the period yet seem, when there is any probability that these prejudices shall be completely abandoned !

“ But how,” said Telemachus to Narbal, “ can such a commerce as this of Tyre be established at Ithaca ?”

“ By the same means,” said Narbal, “ that have established it here. Receive all strangers with readiness and hospitality ; let them find convenience and liberty in your ports ; and be careful never to disgust them by avarice or pride : above all, never restrain the freedom of commerce, by rendering it subservient to your own immediate gain. The pecuniary advantages of commerce should be left wholly to those by whose labour it subsists ; lest this labour, for want of a sufficient motive, should cease. There are more than equivalent advantages of another kind, which must necessarily result to the Prince from the wealth which a free commerce will bring into his state ; and commerce is a kind of spring, which to divert from its natural channel is to lose.”¹ Had the same question been put to Smith or to Franklin in the present age, what sounder advice could they have offered ?

In one of Fenelon’s *Dialogues of the Dead*, the following remarkable words are put into the mouth of Socrates : “ it is necessary that a people should have written laws, always the same, and consecrated by the whole nation :

¹ Hawkesworth’s Translation.

that these laws should be paramount to every thing else ; that those who govern should derive their authority from *them* alone ; possessing an unbounded power to do all the good which the laws prescribe, and restrained from every act of injustice which the laws prohibit."

But it is chiefly in a work which did not appear till many years after his death, that we have an opportunity of tracing the enlargement of Fenelon's political views, and the extent of his Christian charity. It is entitled *Direction pour la Conscience d'un Roi* ; and abounds with as liberal and enlightened maxims of government as, under the freest constitutions, have ever been offered by a subject to a sovereign. Where the variety of excellence renders selection so difficult, I must not venture upon any extracts ; nor, indeed, would I willingly injure the effect of the whole by quoting detached passages. A few sentences on *liberty of conscience* (which I will not presume to translate) may suffice to convey an idea of the general spirit with which it is animated. "Sur toute chose, ne forcez jamais vos sujets à changer de religion. Nulle puissance humaine ne peut forcer le retranchement impénétrable de la liberté du coeur. La force ne peut jamais persuader les hommes ; elle ne fait que des hypocrites. Quand les rois se mêlent de religion, au lieu de la protéger, ils la mettent en servitude. Accordez à tous la tolerance civile, non en approuvant tout comme indifférent, mais en souffrant avec patience tout ce que Dieu souffre, et en tâchant de ramener les hommes par une douce persuasion."

AND SO MUCH for the French philosophy of the seventeenth century. The extracts last quoted forewarn us, that we are fast approaching to a new era in the history of

the Human Mind. *The glow-worm 'gins to pale his ineffectual fire; and we scent the morning air of the coming day.* This era I propose to date from the publications of Locke and of Leibnitz; but the remarks which I have to offer on their writings, and on those of their most distinguished successors, I reserve for the Second Part of this Discourse; confining myself, at present, to a very short retrospect of the state of philosophy, during the preceding period, in some other countries of Europe.¹

SECTION III.

Progress of Philosophy during the Seventeenth Century, in some parts of Europe, not included in the preceding Review.

DURING the first half of the seventeenth century, the philosophical spirit which had arisen with such happy auspices in England and in France, has left behind it few or no traces of its existence in the rest of Europe. On all questions connected with *the science of mind* (a phrase which I here use in its largest acceptation,) authority continued to be every where mistaken for argument; nor can a single work be named, bearing, in its character, the most distant resemblance to the *Organon* of Bacon; to the *Meditations* of Descartes; or to the bold theories of that sublime genius who, soon after, was to shed so dazzling a lustre on the north of Germany. Kepler and Galileo still

¹ I have classed *Télémaque* and the *Direction pour la Conscience d'un Roi* with the philosophy of the seventeenth century, although the publication of the former was not permitted till after the death of Louis XIV, nor that of the latter till 1748. The tardy appearance of both only shows how far the author had shot a-head of the orthodox religion and politicks of his times.

lived; the former languishing in poverty at Prague; the latter oppressed with blindness, and with ecclesiastical persecution at Florence; but their pursuits were of a nature altogether foreign to our present subject.

One celebrated work alone, the treatise of Grotius *De Jure Belli et Pacis* (first printed in 1625,) arrests our attention among the crowd of useless and forgotten volumes, which were then issuing from the presses of Holland, Germany, and Italy. The influence of this treatise, in giving a new direction to the studies of the learned, was so remarkable, and continued so long to operate with undiminished effect, that it is necessary to allot to the author, and to his successors, a space considerably larger than may, at first sight, seem due to their merits. Notwithstanding the just neglect into which they have lately fallen in our Universities, it will be found, on a close examination, that they form an important link in the history of modern literature. It was from their school that most of our best writers on Ethics have proceeded, and many of our most original inquirers into the Human Mind; and it is to the same school (as I shall endeavour to shew in the Second Part of this Discourse,) that we are chiefly indebted for the modern science of Political Economy.¹

For the information of those who have not read the treatise *De Jure Belli et Pacis*, it may be proper to observe, that, under this title, Grotius has aimed at a complete system of Natural Law. Condillac says, that he chose the title, in order to excite a more general curiosity; add-

¹ From a letter of Grotius, quoted by Gassendi, we learn, that the treatise *De Jure Belli et Pacis* was undertaken at the request of his learned friend Peireskios. “Non otior, sed in illo de jure gentium opere pergo, quod si tale futurum est, ut lectores demereri possit, habebit quod tibi debeat posteritas, qui me ad hunc laborem et auxilio et hortatu tuo excitasti.” *Gassendi Opera*, Tom. V, p. 294.

ing (and, I believe, very justly,) that many of the most prominent defects of his work may be fairly ascribed to a compliance with the taste of his age. “The author,” says Condillac, “was able to think for himself; but he constantly labours to support his conclusions by the authority of others; producing, on many occasions, in support of the most obvious and indisputable propositions, a long string of quotations from the Mosaick law; from the Gospels; from the Fathers of the Church; from the Casuists; and not unfrequently, in the very same paragraph, from Ovid and Aristophanes.” In consequence of this cloud of witnesses, always at hand to attest the truth of his axioms, not only is the attention perpetually interrupted and distracted; but the author’s reasonings, even when perfectly solid and satisfactory, fail in making a due impression on the reader’s mind; while the very little that there probably was of systematical arrangement in the general plan of the book, is totally kept out of view.

In spite of these defects, or rather, perhaps, in consequence of some of them, the impression produced by the treatise in question, on its first publication, was singularly great. The stores of erudition displayed in it, recommended it to the classical scholar; while the happy application of the author’s reading to the affairs of human life, drew the attention of such men as Gustavus Adolphus; of his Prime Minister, the Chancellor Oxenstiern; and of the Elector Palatine, Charles Lewis. The last of these was so struck with it, that he founded at Heidelberg a Professorship for the express purpose of teaching the Law of Nature and Nations;—an office which he bestowed on Puffendorff; the most noted, and, on the whole, the most eminent of those who have aspired to tread in the footsteps of Grotius.

The fundamental principles of Puffendorff possess little merit in point of originality, being a sort of medley of the doctrines of Grotius, with some opinions of Hobbes; but his book is entitled to the praise of comparative conciseness, order, and perspicuity; and accordingly came very generally to supplant the treatise of Grotius, as a manual or institute for students, notwithstanding its immense inferiority in genius, in learning, and in classical composition.

The authors who, in different parts of the Continent, have since employed themselves in commenting on Grotius and Puffendorff; or in abridging their systems; or in altering their arrangements, are innumerable; but notwithstanding all their industry and learning, it would be very difficult to name any class of writers, whose labours have been of less utility to the world. The same ideas are constantly recurring in an eternal circle; the opinions of Grotius and of Puffendorff, where they are at all equivocal, are anxiously investigated, and sometimes involved in additional obscurity; while, in the meantime, the science of Natural Jurisprudence never advances one single step; but, notwithstanding its recent birth, seems already sunk into a state of dotage. ¹

In perusing the systems now referred to, it is impossible not to feel a very painful dissatisfaction, from the difficulty of ascertaining the precise object aimed at by the authors. So vague and indeterminate is the general scope of their

¹ I have borrowed, in this last paragraph, some expressions from Lampredi. “Grotii et Puffendorffii interpretes, viri quidem diligentissimi, sed qui vix fructum aliquem tot commentariis, annotationibus, compendiis, tabulis, ceterisque ejusmodi aridissimis laboribus attulerunt: perpetuo circulo eadem res circumagitur, quid uterque senserit quaeritur, interdum etiam utriusque sententiae obscurantur; disciplina nostra tamen ne latum quidem unguem progreditur, et dum aliorum sententiae disquiruntur et explanantur, Rerum Natura quasi senio confecta squalescit, neglectaque jacet et inobservata omnino.” (*Juris Publici Theoremata*, p. 34.)

researches, that not only are different views of the subject taken by different writers, but even by the same writer in different parts of his work ;—a circumstance which, of itself, sufficiently accounts for the slender additions they have made to the stock of useful knowledge ; and which is the real source of that chaos of heterogeneous discussions, through which the reader is perpetually forced to fight his way. A distinct conception of these different views will be found to throw more light than might at first be expected on the subsequent history of Moral and of Political science ; and I shall therefore endeavour, as accurately as I can, to disentangle and separate them from each other, at the risk, perhaps, of incurring, from some readers, the charge of prolixity. The most important of them may, I apprehend, be referred to one or other of the following heads :

1, Among the different ideas which have been formed of Natural Jurisprudence, one of the most common (particularly in the earlier systems) supposes its object to be—To lay down those rules of justice which *would* be binding on men living in a social state, without any positive institutions ; or (as it is frequently called by writers on this subject,) living together in a *state of nature*. This idea of the province of Jurisprudence seems to have been uppermost in the mind of Grotius, in various parts of his treatise.

To this speculation about the state of nature, Grotius was manifestly led by his laudable anxiety to counteract the attempts then recently made to undermine the foundations of morality. That moral distinctions are created entirely by the arbitrary and revealed will of God, had, before his time, been zealously maintained by some theologians even of the reformed church ; while, among the political theorists of the same period, it was not unusual to refer

these distinctions (as was afterwards done by Hobbes) to the positive institutions of the civil magistrate. In opposition to both, it was contended by Grotius, that there is a natural law coëval with the human constitution, from which positive institutions derive all their force; a truth which, how obvious and tritival soever it may now appear, was so opposite in its spirit to the illiberal systems taught in the monkish establishments, that he thought it necessary to exhaust in its support all his stores of ancient learning. The older writers on Jurisprudence must, I think, be allowed to have had great merit in dwelling so much on this fundamental principle; a principle which renders "*Man a Law to Himself*;" and which, if it be once admitted, reduces the metaphysical question concerning the nature of the moral faculty to an object merely of speculative curiosity.¹ To this faculty the ancients frequently give the name of *reason*; as in that noted passage of Cicero, where he observes, that "right reason is itself *a law*; congenial to the feelings of nature; diffused among all men; uniform; eternal; calling us imperiously to our duty, and peremptorily prohibiting every violation of it. Nor does it speak," continues the same author, "one language at Rome and

¹ "Upon whatever we suppose that our moral faculties are founded, whether upon a certain modification of reason, upon an original instinct, called a moral sense, or upon some other principle of our nature, it cannot be doubted that they were given us for the direction of our conduct in this life. They carry along with them the most evident badges of this authority, which denote that they were set up within us to be the supreme arbiters of all our actions, to superintend all our senses, passions, and appetites, and to judge how far each of them was either to be indulged or restrained. The rules, therefore, which they prescribe, are to be regarded as the commands and *laws of the Deity*, promulgated by those vicegerents which he has set up within us." (Smith's *Theory of Moral Sentiments*, Part iii, chap. v.)—See also Dr. Butler's very original and philosophical *Discourses on Human Nature*.

another at Athens, varying from place to place, or time to time ; but it addresses itself to all nations, and to all ages ; deriving its authority from the common sovereign of the universe, and carrying home its sanctions to every breast, by the inevitable punishment which it inflicts on transgressors.”¹

The habit of considering morality under the similitude of a *law*, (a *law* engraved on the human heart,) led not unnaturally to an application to ethical subjects of the technical language and arrangements of the Roman jurisprudence ; and this innovation was at once facilitated and encouraged, by certain peculiarities in the nature of the most important of all the virtues,—that of justice ; peculiarities which, although first explained fully by Hume and Smith, were too prominent to escape altogether the notice of preceding moralists.

The circumstances which distinguish justice from the other virtues, are chiefly two. In the first place, its rules may be laid down with a degree of accuracy, whereof moral precepts do not, in any other instance, admit. Secondly, its rules may be enforced, inasmuch as every transgression of them implies a violation of the rights of others. For the illustration of both propositions, I must refer to the eminent authors just mentioned.

As, in the case of justice, there is always a right, on the one hand, corresponding to an obligation on the other, the various rules enjoined by it may be stated in two different forms ; either as a system of duties, or as a system of rights. The former view of the subject belongs properly to the moralists—the latter to the lawyer. It is this last view that the writers on Natural Jurisprudence (most of whom were lawyers by profession) have in general cho-

¹ *Frag. Lib. iii, de Rep.*

sen to adopt ; although, in the same works, both views will be found to be not unfrequently blended together.

To some indistinct conception, among the earlier writers on Natural Law, of these peculiarities in the nature of justice, we may probably ascribe the remarkable contrast pointed out by Mr. Smith, between the ethical systems of ancient and of modern times. "In none of the ancient moralists," he observes, "do we find any attempt towards a particular enumeration of the rules of justice. On the contrary, Cicero in his *Offices*, and Aristotle in his *Ethicks*, treat of justice in the same general manner in which they treat of generosity or of charity."

¹

But, although the rules of justice are in every case precise and indispensable ; and although their authority is altogether independent of that of the civil magistrate, it would obviously be absurd to spend much time in speculating about the principles of this natural law, as applicable to men before the establishment of government. The same state of society, which diversifies the condition of individuals to so great a degree, as to suggest problematical questions with respect to their rights and their duties, necessarily gives birth to certain conventional laws or customs, by which the conduct of the different members of the association is to be guided ; and agreeably to which the disputes that may arise among them are to be adjusted. The imaginary state referred to under the title of the *State of Nature*, though it certainly does not exclude the idea of a *moral right of property arising from labour*, yet it excludes all that variety of cases concerning its alienation and transmission, and the mutual covenants of parties, which the political union alone could create ;—an order of things, indeed, which is virtually supposed in almost all

¹ *Theory of Moral Sentiments*, Part vii, sect. iv.

the speculations about which the law of nature is commonly employed.

2, It was probably in consequence of the very narrow field of study, which Jurisprudence, considered in this light, was found to open, that its province was gradually enlarged, so as to comprehend, not merely the rules of justice, but the rules enjoining all our other moral duties. Nor was it only the *province* of Jurisprudence which was thus enlarged. A corresponding extension was also given, by the help of arbitrary definitions, to its *technical phraseology*, till at length the whole doctrines of practical ethicks came to be moulded into an artificial form, originally copied from the Roman code. Although justice is the only branch of virtue in which every moral Obligation implies a corresponding Right, the writers on Natural Law have contrived, by fictions of *imperfect rights*, and of *external rights*, to treat indirectly of all our various duties, by pointing out the rights which are supposed to be their correlates:—in other words, they have contrived to exhibit, in the form of a system of rights, a connected view of the whole duty of man. This idea of Jurisprudence, which identifies its object with that of Moral Philosophy, seems to coincide nearly with that of Puffendorff; and some vague notion of the same sort has manifestly given birth to many of the digressions of Grotius.

Whatever judgment may now be pronounced on the effects of this innovation, it is certain that they were considered, not only at the time, but for many years afterwards, as highly favourable. A very learned and respectable writer, Mr. Carmichael of Glasgow, compares them to the improvements made in Natural Philosophy by the followers of Lord Bacon. “No person,” he observes, “liberally educated, can be ignorant, that, within the recollection of ourselves and of our fathers, philosophy has

advanced to a state of progressive improvement hitherto unexampled; in consequence partly of the rejection of scholastick absurdities, and partly of the accession of new discoveries. Nor does this remark apply solely to Natural Philosophy, in which the improvements accomplished by the united labours of the learned have forced themselves on the notice even of the vulgar, by their palpable influence on the mechanical arts. The other branches of philosophy also have been prosecuted during the last century with no less success; and none of them in a more remarkable degree than the science of Morals.

“This science, so much esteemed, and so assiduously cultivated by the sages of antiquity, lay, for a length of time, in common with all the other useful arts, buried in the rubbish of the dark ages, till (soon after the commencement of the seventeenth century,) the incomparable treatise of *Grotius de Jure Belli et Pacis* restored to more than its ancient splendour that part of it which defines the relative duties of individuals; and which, in consequence of the immense variety of cases comprehended under it, is by far the most extensive of any. Since that period, the most learned and polite scholars of Europe, as if suddenly roused by the alarm of a trumpet, have vied with each other in the prosecution of this study,—so strongly recommended to their attention, not merely by its novelty, but by the importance of its conclusions, and the dignity of its object.”¹

¹ The last sentence is thus expressed in the original. “Ex illo tempore, quasi classico dato, ab eruditissimis passim et politissimis viris excoli certatim coepit utilissima haec nobilissimaeque doctrina.” (See the edition of Puffendorff, *De officio Hominis et Civis*, by Professor Gerschom Carmichael of Glasgow, 1724;) an author whom Dr. Hutcheson pronounces to be “by far the best commentator on Puffendorff; and “whose notes,”

I have selected this passage, in preference to many others that might be quoted to the same purpose from writers of higher name; because, in the sequel of this historical sketch, it appears to me peculiarly interesting to mark the progress of Ethical and Political speculation in

he adds, "are of much more value than the *text*." See his short *Introduction to Moral Philosophy*.

Puffendorff's principal work, entitled *De Jure Naturae et Gentium*, was first printed in 1672, and was afterwards abridged by the author into the small volume referred to in the foregoing paragraph. The idea of Puffendorff's aim, formed by Mr. Carmichael, coincides exactly with the account of it given in the text: "Hoc demum tractatu edito, facile intellexerunt aequiores harum rerum arbitri, non aliam esse genuinam *Morum Philosophiam*, quam quae ex evidentibus principiis, in ipsa rerum natura fundatis, hominis atque civis officia, in singulis vitae humanae circumstantiis debita, eruit ac demonstrat; atque adeo Juris Naturalis scientiam, quantumvis diversam ab Ethica quae in scholis dudum obtinuerat, prae se ferret faciem, non esse, quod ad scopum et rem tractandam, verè aliam disciplinam, sed eandem rectius duntaxat et solidius traditam, ita ut, ad quam prius male collineaverit, tandem reipsâ feriret scopum." See Carmichael's edition of the Treatise *De Officio Hominis et Civis*, p. 7.

To so late a period did this admiration of the Treatise, *De Officio Hominis et Civis*, continue in our Scotch Universities, that the very learned and respectable Sir John Pringle (afterwards President of the Royal Society of London,) adopted it as the text-book for his lectures, while he held the Professorship of Moral Philosophy at Edinburgh. Nor does the case seem to have been different in England. "I am going," says Gray, in a letter written while a student at Cambridge, "to attend a lecture on *one* Puffendorff." And, much in the same spirit, Voltaire thus expresses himself with respect to the schools of the Continent: "On est partagé, dans les écoles, entre Grotius et Puffendorff. Croyez moi, lisez les Offices de Cicéron." From the contemptuous tone of these two writers, it should seem that the old systems of Natural Jurisprudence had entirely lost their credit among men of taste and of enlarged views, long before they ceased to form an essential part of accademical instruction; thus affording an additional confirmation of Mr. Smith's complaint, that "the greater part of universities have not been very forward to adopt improvements after they were made; and that several of those learned societies have chosen to remain,

that seat of learning, which, not many years afterwards, was to give birth to the *Theory of Moral Sentiments*, and to the *Inquiry into the Nature and Causes of the Wealth of Nations*. The powerful effect which the last of these works has produced on the political opinions of the whole civilized world, renders it unnecessary, in a Discourse destined to form part of a Scottish *Encyclopædia*, to offer any apology for attempting to trace, with some minuteness, the train of thought by which an undertaking, so highly honourable to the literary character of our country, seems to have been suggested to the author.

The extravagance of the praise lavished on Grotius and Puffendorff, in the above citation from Carmichael, can be accounted for only by the degraded state into which Ethicks had fallen in the hands of those who were led to the study of it, either as a preparation for the casuistical discussions subservient to the practice of auricular confession, or to justify a scheme of morality which recommended the useless austerities of an ascetick retirement, in preference to the manly duties of social life. The practical doctrines inculcated by the writers on Natural Law, were all of them favourable to active virtue; and, how reprehensible soever in point of form, were not only harmless, but highly beneficial in their tendency. They were at the same time so diversified (particularly in the work of Grotius) with beautiful quotations from the Greek and Roman classicks, that they could not fail to present a striking contrast to the absurd and illiberal systems which they supplanted; and perhaps to these passages, to which

for a long time, the sanctuaries, in which exploded systems found shelter and protection. after they had been hunted out of every other corner of the world." Considering his own successful exertions, in his academical capacity, to remedy this evil, it is more than probable that Mr. Smith had Grotius and Puffendorff in his view, when he wrote the foregoing sentence.

they thus gave a sort of systematical connexion, the progress which the science made in the course of the eighteenth century, may, in no inconsiderable degree, be ascribed. Even now, when so very different a taste prevails, the treatise *De Jure Belli et Pacis* possesses many charms to a classical reader; who, although he may not always set a very high value on the author's reasonings, must at least be dazzled and delighted with the splendid profusion of his learning.

The field of Natural Jurisprudence, however, was not long to remain circumscribed within the narrow limits commonly assigned to the province of Ethicks. The contrast between natural law and positive institution, which it constantly presents to the mind, gradually and insensibly suggested the idea of comprehending under it every question concerning right and wrong, on which positive law is silent. Hence the origin of two different departments of Jurisprudence, little attended to by some of the first authors who treated of it, but afterwards, from their practical importance, gradually encroaching more and more on those ethical disquisitions by which they were suggested. Of these departments, the one refers to the conduct of individuals in those violent and critical moments when the bonds of political society are torn asunder; the other, to the mutual relations of independent communities. The questions connected with the former article, lie indeed within a comparatively narrow compass; but on the latter so much has been written, that what was formerly called Natural Jurisprudence, has been, in later times, not unfrequently distinguished by the title of the *Law of Nature and Nations*. The train of thought by which both subjects came to be connected with the systems now under consideration, consists of a few very simple and obvious steps.

As an individual who is a member of a political body necessarily gives up his will to that of the governours who are entrusted by the people with the supreme power, it is his duty to submit to those inconveniences which, in consequence of the imperfection of all human establishments, may incidentally fall to his own lot. This duty is founded on the Law of Nature, from which, indeed, (as must appear evident on the slightest reflection) conventional law derives all its *moral* force and obligation. The great end, however, of the political union being a sense of general utility, if this end should be manifestly frustrated, either by the injustice of laws, or the tyranny of rulers, individuals must have recourse to the principles of natural law, in order to determine how far it is competent for them to withdraw themselves from their country, or to resist its governours by force. To Jurisprudence, therefore, considered in this light, came with great propriety to be referred all those practical discussions which relate to the limits of allegiance, and the right of resistance.

By a step equally simple, the province of the science was still farther extended. As independent states acknowledge no superiour, the obvious inference was, that the disputes arising among them must be determined by an appeal to the Law of Nature; and accordingly, this law, when applied to states, forms a separate part of Jurisprudence, under the title of the Law of Nations. By some writers we are told, that the general principles of the Law of Nature, and of the Law of Nations, are one and the same, and that the distinction between them is merely verbal. To this opinion, which is very confidently stated by Hobbes,¹ Puffendorff has given his sanction; and, in

¹ “Lex Naturalis dividi potest in naturalem hominum, quae sola obtinuit dici Lex Naturae, et naturalem civitatum, quae

conformity to it, contents himself with laying down the general principles of natural law, leaving it to the reader to apply it as he may find necessary, to individuals or to societies.

The later writers on Jurisprudence have thought it expedient to separate the law of nations from that part of

dici potest Lex Gentium, vulgo autem Jus Gentium appellatur. Praecepta utriusque eadem sunt; sed quia civitates semel institutae induunt proprietates hominum personales, lex, quam loquentes de hominum singulorum officio naturalem dicimus, applicata totis civitatibus, nationibus, sive gentibus, vocatur Jus Gentium.' *De Cive*, cap. xiv, § 4.

In a late publication, from the title of which some attention to dates might have been expected, we are told, that "Hobbes's book *De Cive* appeared but a little time *before* the treatise of Grotius;" whereas, in point of fact, Hobbes's book did not *appear* till twenty-two years *after* it. A few copies were indeed printed at Paris, and privately circulated by Hobbes, as early as 1642, but the book was not published till 1647. (See "*An Inquiry into the Foundation and History of the Law of Nations in Europe, &c.*" by Robert Ward of the Inner Temple, Esq. London, 1795.) This inaccuracy, however, is trifling, when compared with those committed in the same work, in stating the distinguishing doctrines of the two systems.

As a writer on the Law of Nations, Hobbes is now altogether unworthy of notice. I shall therefore only remark on this part of his philosophy, that its aim is precisely the *reverse* of that of Grotius; the latter labouring, through the whole of his treatise, to extend, as far as possible, among independent states, the same laws of justice and of humanity, which are universally recognized among individuals; while Hobbes, by *inverting* the argument, exerts his ingenuity to shew, that the moral repulsion which commonly exists between independent and neighbouring communities, is an exact picture of that which existed among individuals prior to the origin of government. The inference, indeed, was most illogical, inasmuch as it is the social attraction among individuals which is the source of the mutual repulsion among nations: and as this attraction invariably operates with the greatest force, where the individual is the most completely independent of his species, and where the advantages of the political union are the least sensibly felt. If, in any state of human nature, it be in danger of becoming quite evanescent, it is in large and civilized empires, where man becomes indispen-

the science which treats of the duties of individuals ;' but without being at sufficient pains to form to themselves a definite idea of the object of their studies. Whoever takes the trouble to look into their systems, will immediately perceive, that their leading aim is not (as might have been expected,) to ascertain the great principles of morality binding on all nations in their intercourse with each other ; or to point out with what limitations the ethical rules recognized among individuals must be understood, when extended to political and unconnected bodies ; but to exhibit a digest of those laws and usages, which, partly from considerations of utility, partly from accidental circumstances, and partly from positive conventions, have gradually arisen among those states of Christendom, which, from their mutual connexions, may be considered as forming one great republick. It is evident, that such a digest has no more connexion with the Law of Nature, properly so called, than it has with the rules of the Roman law, or of any other municipal code. The details contained in it

sably necessary to man : depending for the gratification of his artificial wants on the cooperation of thousands of his fellow citizens.

Let me add, that the theory, so fashionable at present, which resolves the whole of morality into the principle of *utility*, is more nearly akin to Hobbism, than some of its partisans are aware of.

¹ The credit of this improvement is ascribed by Vattel (one of the most esteemed writers on the subject,) to the celebrated German philosopher Wolfius, whose labours in this department of study he estimates very highly. (*Questions de Droit Naturel*. Berne, 1762.) Of this great work I know nothing but the title, which is not calculated to excite much curiosity in the present times : “*Christiani Wolfii jus Naturae methodo scientifica pertractatum*, in 9 Tomes distributum.” (Francof. 1740.) “Non est,” says Lampredi, *himself* a professor of publick law, “qui non deterreatur tanta librorum farragine, quasi vero Herculeo labore opus esset, ut quis honestatem et justitiam addiscat.

are highly interesting and useful in themselves ; but they belong to a science altogether different ; a science, in which the ultimate appeal is made, not to abstract maxims of right and wrong, but to precedents, to established customs, and to the authority of the learned.

The intimate alliance, however, thus established between the Law of Nature and the conventional Law of Nations, has been on the whole attended with fortunate effects. In consequence of the discussions concerning questions of justice and of expediency which came to be blended with the details of publick law, more enlarged and philosophical views have gradually presented themselves to the minds of speculative statesmen ; and, in the last result, have led, by easy steps, to those liberal doctrines concerning commercial policy, and the other mutual relations of separate and independent states, which, if they should ever become the creed of the rulers of mankind, promise so large an accession to human happiness.

3, Another idea of Natural Jurisprudence, essentially distinct from those hitherto mentioned, remains to be considered. According to this, its object is to ascertain the general principles of justice which *ought to be* recognized in every municipal code ; and to which it *ought to be* the aim of every legislator to accommodate his institutions. It is to this idea of Jurisprudence that Mr. Smith has given his sanction in the conclusion of his Theory of Moral Sentiments ; and this he seems to have conceived to have been likewise the idea of Grotius, in the treatise *De Jure Belli et Pacis*.

“ It might have been expected,” says Mr. Smith, “ that the reasonings of lawyers upon the different imperfections and improvements of the laws of different countries, should have given occasion to an inquiry into what were the natural rules of justice, independent of all positive institution. It

might have been expected, that these reasonings should have led them to aim at establishing a system of what might properly be called Natural Jurisprudence, or *a theory of the principles which ought to run through, and to be the foundation of the laws of all nations*. But though the reasonings of lawyers did produce something of this kind, and though no man has treated systematically of the laws of any particular country, without intermixing in his work many observations of this sort, it was very late in the world before any such general system was thought of, or before the philosophy of laws was treated of by itself, and without regard to the particular institutions of any nation. Grotius seems to have been the first who attempted to give the world any thing like a system of those principles which ought to run through, and be the foundation of the laws of all nations; and his *Treatise of the Laws of Peace and War*, with all its imperfections, is perhaps, at this day, the most complete work that has yet been given on the subject.”

Whether this was, or was not, the leading object of Grotius, it is not material to decide; but if this *was* his object, it will not be disputed that he has executed his design in a very desultory manner, and that he often seems to have lost sight of it altogether, in the midst of those miscellaneous speculations on political, ethical, and historical subjects, which form so large a portion of his *Treatise*, and which so frequently succeed each other without any apparent connexion or common aim. ¹

¹ “Of what stamp,” says a most ingenious and original thinker. “are the works of Grotius, Puffendorff, and Burlamaqui? Are they political or ethical, historical or juridical, expository or censorial?—Sometimes one thing, sometimes another: they seem hardly to have settled the matter with themselves.” Bentham’s *Introduction to the Principles of Morals and Legislation*, p. 327.

Nor do the views of Grotius appear always enlarged or just, even when he is pointing at the object described by Mr. Smith. The Roman system of Jurisprudence seems to have warped, in no inconsiderable degree, his notions on all questions connected with the theory of legislation, and to have diverted his attention from that philosophical idea of law, so well expressed by Cicero,—“Non a praetoris edicto, neque a duodecim tabulis, sed penitus ex intima philosophia, hauriendam juris disciplinam.” In this idolatry, indeed, of the Roman law, he has not gone so far as some of his commentators, who have affirmed, that it is only a different name for the Law of Nature; but that his partiality for his professional pursuits has often led him to overlook the immense difference between the state of society in ancient and modern Europe, will not, I believe, be now disputed. It must, at the same time, be mentioned to his praise, that no writer appears to have been, *in theory*, more completely aware of the essential distinction between Natural and Municipal laws. In one of the paragraphs of his *Prolegomena*, he mentions it as a part of his general plan, to illustrate the Roman code, and to systematize those parts of it which have their origin in the Law of Nature. “The task,” says he, “of moulding it into the form of a system, has been projected by many, but hitherto accomplished by none. Nor indeed was the thing possible, while so little attention was paid to the distinction between natural and positive institutions; for the former being every where the same, may be easily traced to a few general principles, while the latter, exhibiting different appearances at different times, and in different places, elude every attempt towards methodical arrangement, no less than the insulated facts which individual objects present to our external senses.”

This passage of Grotius has given great offence to two of the most eminent of his commentators, Henry and Samuel

de Cocceii, who have laboured much to vindicate the Roman legislators against that indirect censure which the words of Grotius appear to convey. "My chief object," says the latter of those writers, "was, by deducing the Roman law from its source in the nature of things, to reconcile Natural Jurisprudence with the civil code; and, at the same time, to correct the supposition implied in the foregoing passage of Grotius, which is indeed one of the most exceptionable to be found in his work. The remarks on this subject, scattered over the following commentary, the reader will find arranged in due order in my twelfth Preliminary Dissertation, the chief design of which is to systematize the whole Roman law, and to demonstrate its beautiful coincidence with the Law of Nature." In the execution of this design, Cocceii must, I think, be allowed to have contributed a very useful supplement to the jurisprudential labours of Grotius, the Dissertation in question being eminently distinguished by that distinct and luminous method, the want of which renders the study of the treatise *De Jure Belli et Pacis* so peculiarly irksome and unsatisfactory.

The superstitious veneration for the Roman code expressed by such writers as the Cocceii, will appear less wonderful, when we attend to the influence of the same prejudice on the liberal and philosophical mind of Leibnitz; an author, who has not only gone so far as to compare the civil law (considered as a monument of human genius) with the remains of the ancient Greek geometry; but has strongly intimated his dissent from the opinions of those who have represented its principles as being frequently at variance with the Law of Nature. In one very powerful paragraph, he expresses himself thus: "I have often said, that, after the writings of geometricians, there exists nothing which, in point of strength, subtilty, and depth,

can be compared to the works of the Roman lawyers.

And as it would be scarcely possible, from mere intrinsic evidence, to distinguish a demonstration of Euclid's from one of Archimedes or of Apollonius (the style of all of them appearing no less uniform than if reason herself were speaking through their organs,) so also the Roman lawyers all resemble each other like twin brothers; insomuch that, from the style alone of any particular opinion or argument, hardly any conjecture could be formed about its author. Nor are the traces of a refined and deeply meditated system of Natural Jurisprudence any where to be found more visible, or in greater abundance. And even in those cases where its principles are departed from, either in compliance with the language consecrated by technical forms, or in consequence of new statutes, or of ancient traditions, the conclusions which the assumed hypothesis renders it necessary to incorporate with the eternal dictates of right reason, are deduced with the soundest logick, and with an ingenuity that excites admiration. *Nor are these deviations from the Law of Nature so frequent as is commonly apprehended."*

In the last sentence of this passage, Leibnitz had probably an eye to the works of Grotius and his followers; which, however narrow and timid in their views they may now appear, were, for a long time, regarded among civilians as savouring somewhat of theoretical innovation, and of political heresy.

To all this may be added, as a defect still more important and radical in the systems of Natural Jurisprudence considered as models of universal legislation, that their authors reason concerning laws too abstractedly, without specifying the particular circumstances of the society to which they mean that their conclusions should be applied. It is very justly observed by Mr. Bentham, that, "if there

are any books of universal Jurisprudence, they must be looked for within very narrow limits." He certainly, however, carries this idea too far, when he asserts, that "to be susceptible of an universal application, *all* that a book of the expository kind can have to treat of, is *the import of words*; and that, to be strictly speaking universal, it must confine itself to terminology; that is, to an explanation of such words connected with law, as *power, right, obligation, liberty*, to which are words pretty exactly correspondent in all languages."¹ His expressions, too, are somewhat unguarded, when he calls the *Law of Nature* "an obscure phantom, which, in the imaginations of those who go in chase of it, points sometimes to *manners*, sometimes to *laws*, sometimes to what law *is*, sometimes to what it *ought to be*."² Nothing, indeed, can be more exact and judicious than this description, when restricted to the *Law of Nature*, as commonly treated of by writers on Jurisprudence; but if extended to the *Law of Nature*, as originally understood among ethical writers, it is impossible to assent to it, without abandoning all the principles on which the science of morals ultimately rests. With these obvious, but, in my opinion, very essential limitations, I perfectly agree with Mr. Bentham, in considering an abstract code of laws as a thing equally unphilosophical in the design, and useless in the execution.

In stating these observations, I would not be understood to dispute the utility of turning the attention of students to a comparative view of the municipal institutions of different nations; but only to express my doubts whether this can be done with advantage, by referring these institutions to that abstract theory called the *Law of Nature*,

¹ *Introduction to the Principles of Morals and Legislation*, p. 323.

² *Ibid.* p. 327.

as to a common standard. The code of some particular country must be fixed on as a groundwork for our speculations ; and its laws studied, not as consequences of any abstract principles of justice, but in their connexion with the circumstances of the people among whom they originated. A comparison of these laws with the corresponding laws of other nations, considered also in their connexion with the circumstances whence they arose, would form a branch of study equally interesting and useful ; not merely to those who have in view the profession of law, but to all who receive the advantages of a liberal education. In fixing on such a standard, the preference must undoubtedly be given to the Roman law, if for no other reason than this, that its technical language is more or less incorporated with all our municipal regulations in this part of the world : and the study of this language, as well as of the other technical parts of Jurisprudence (so revolting to the taste when considered as the arbitrary jargon of a philosophical theory,) would possess sufficient attractions to excite the curiosity, when considered as a necessary passport to a knowledge of that system, which so long determined the rights of the greatest and most celebrated of nations.

“Universal grammar,” says Dr. Lowth, “cannot be taught abstractedly ; it must be done with reference to some language already known, in which the terms are to be explained and the rules exemplified.”¹ The same observation may be applied (and for reasons strikingly analogous) to the science of Natural or Universal Jurisprudence.

Of the truth of this last proposition Bacon seems to have been fully aware ; and it was manifestly some ideas

¹ Preface to his *English Grammar*.

of the same kind which gave birth to Montesquieu's historical speculations with respect to the origin of laws, and the reference which they may be expected to bear, in different parts of the world, to the physical and moral circumstances of the nations among whom they have sprung up. During this long interval, it would be difficult to name any intermediate writer, by whom the important considerations just stated were duly attended to.

In touching formerly on some of Bacon's ideas concerning the philosophy of law, I quoted a few of the most prominent of those fortunate anticipations, so profusely scattered over his works, which, outstripping the ordinary march of human reason, associate his mind with the luminaries of the eighteenth century, rather than with his own contemporaries. These anticipations, as well as many others of a similar description, hazarded by his bold yet prophetick imagination, have often struck me as resembling the *pierres d'attente* jutting out from the corners of an ancient building, and inviting the fancy to complete what was left unfinished of the architect's design;—or the slight and broken sketches traced on the skirts of an American map, to connect its chains of hills and branches of rivers with some future survey of the contiguous wilderness. Yielding to such impressions, and eager to pursue the rapid flight of his genius, let me abandon for a moment the order of time, while I pass from the *Fontes Juris* to the *Spirit of Laws*. To have a just conception of the comparatively limited views of Grotius, it is necessary to attend to what was planned by his immediate predecessor, and first executed (or rather first *begun* to be executed) by one of his remote successors.

The main object of the *Spirit of Laws* (it is necessary here to premise) is to show, not, as has been frequently sup-

posed, what laws *ought* to be,—but how the diversities in the physical and moral circumstances of the human race have contributed to produce diversities in their political establishments, and in their municipal regulations.¹ On this point, indeed, an appeal may be made to the author himself. “I write not,” says he, “to censure any thing established in any country whatsoever; every nation will here find the *reasons* on which its maxims are founded.” This plan, however, which, when understood with proper limitations, is highly philosophical, and which raises Jurisprudence, from the uninteresting and useless state in which we find it in Grotius and Puffendorff, to be one of the most agreeable and important branches of useful knowledge (although the execution of it occupies by far the greater part of his work,) is prosecuted by Montesquieu in so very desultory a manner, that I am inclined to think he rather fell into it insensibly, in consequence of the occasional impulse of accidental curiosity, than from any regular design he had formed to himself when he began to collect materials for that celebrated performance. He seems, indeed, to confess this in the following passage of his preface: “Often have I begun, and as often laid aside, this undertaking. I have followed my observations without any fixed plan, and without thinking either of rules or exceptions. I have found the truth only to lose it again.”

But whatever opinion we may form on this point, Montesquieu enjoys an unquestionable claim to the grand idea of connecting Jurisprudence with History and Philosophy,

¹ This, though somewhat ambiguously expressed, *must*, I think, have been the idea of D'Alembert in the following sentence: “Dans cet ouvrage, M. de Montesquieu s'occupe moins des loix qu'on a faites, que de celles qu'on a du faire.” (*Eloge de M. de Montesquieu.*) According to the most obvious interpretation of his words, they convey a meaning which I conceive to be the very reverse of the truth.

in such a manner as to render them all subservient to their mutual illustration. Some occasional disquisitions of the same kind may, it is true, be traced in earlier writers, particularly in the works of Bodinus; but they are of a nature too trifling to detract from the glory of Montesquieu. When we compare the jurisprudential researches of the latter with the systems previously in possession of the schools, the step which he made appears to have been so vast, as almost to justify the somewhat too ostentatious motto prefixed to them by the author; *Prolem sine Matre creatam*. Instead of confining himself, after the example of his predecessors, to an interpretation of one part of the Roman code by another, he studied the SPIRIT of these laws in the political views of their authors, and in the peculiar circumstances of that extraordinary race. He combined the science of law with the history of political society, employing the latter to account for the varying aims of the legislator; and the former, in its turn, to explain the nature of the government, and the manners of the people. Nor did he limit his inquiries to the Roman law, and to Roman history; but, convinced that the general principles of human nature are every where the same, he searched for new lights among the subjects of every government, and the inhabitants of every climate; and, while he thus opened inexhaustible and unthought of resources to the student of Jurisprudence, he indirectly marked out to the legislator the extent and the limits of his power, and recalled the attention of the philosopher from abstract and useless theories, to the only authentick monuments of the history of mankind.¹

¹ As examples of Montesquieu's peculiar and characteristical style of thinking in *The Spirit of Laws*, may be mentioned his *Observations on the Origin and Revolutions of the Roman Laws on Successions*; and what he has written on the *History of the Civil*

This view of law, which unites History and Philosophy with Jurisprudence, has been followed out with remarkable success by various authors since Montesquieu's time; and for a considerable number of years after the publication of the *Spirit of Laws*, became so very fashionable (particularly in this country,) that many seem to have considered it, *not* as a step towards a farther end, but as exhausting the whole science of Jurisprudence. For such a conclusion there is undoubtedly some foundation, so long as we confine our attention to the ruder periods of society, in which governments and laws may be universally regarded as the gradual result of time and experience, of circumstances and emergencies. In enlightened ages, however, there cannot be a doubt, that political wisdom comes in for its share in the administration of human affairs; and there is reasonable ground for hoping, that its influence will continue to increase, in proportion as the principles of legislation are more generally studied and understood. To suppose the contrary, would reduce us to be mere *spectators* of the progress and decline of society, and put an end to every species of patriotick exertion.

Montesquieu's own aim in his historical disquisitions, was obviously much more deep and refined. In various instances, one would almost think he had in his mind the very shrewd aphorism of Lord Coke, that, "to trace an error to its fountain-head, is to refute it;"—a species of refutation, which, as Mr. Bentham has well remarked, is, with many understandings, the only one that has any weight.¹

Laws in his own Country; above all, his *Theory of the Feudal Laws among the Franks*, considered in relation to the revolutions of their monarchy. On many points connected with these researches, his conclusions have been since controverted; but all his successors have agreed in acknowledging *him* as their common master and guide.

¹ "If our ancestors have been all along under a mistake, how came they to have fallen into it?" is a question that naturally occurs

To men prepossessed with a blind veneration for the wisdom of antiquity, and strongly impressed with a conviction that every thing they see around them is the result of the legislative wisdom of their ancestors, the very existence of a legal principle, or of an established custom, becomes an argument in its favour ; and an argument to which no reply can be made, but by tracing it to some acknowledged prejudice, or to a form of society so different from that existing at present, that the same considerations which serve to account for its first origin, demonstrate indirectly the expediency of now accommodating it to the actual circumstances of mankind. According to this view of the subject, the speculations of Montesquieu were ultimately directed to the same practical conclusion with that pointed out in the prophetick suggestions of Bacon ; aiming, however, at this object, by a process more circuitous ; and, perhaps, on that account, the more likely to be effectual. The plans of both have been since combined with extraordinary sagacity, by some of the later writers on Political Economy ;¹

upon all such occasions. The case is, that, in matters of law more especially, such is the dominion of authority over our minds, and such the prejudice it creates in favour of whatever institution it has taken under its wing, that, after all manner of reasons that can be thought of in favour of the institution have been shewn to be insufficient, we still cannot forbear looking to some unassignable and latent reason for its efficient cause. But if, instead of any such reason, we can find a cause for it in some notion, of the erroneousness of which we are already satisfied, then at last we are content to give it up without further struggle ; and then, and not till then, our satisfaction is complete." *Defence of Usury*, pp. 94, 95.

¹ Above all, by Mr. Smith ; who, in his *Wealth of Nations*, has judiciously and skilfully combined with the investigation of general principles, the most luminous sketches of *Theoretical History* relative to that form of political society, which has given birth to so many of the institutions and customs peculiar to modern Europe.—“ The strong ray of philosophick light on this interesting subject,” which, according to Gibbon, “ broke from

but with *their* systems we have no concern in the present section. I shall therefore only remark, in addition to the foregoing observations, the peculiar utility of these researches concerning the *history* of laws, in repressing the folly of sudden and violent innovation, by illustrating the reference which laws must necessarily have to the actual circumstances of a people,—and the tendency which natural causes have to improve gradually and progressively the condition of mankind, under every government which allows them to enjoy the blessings of peace and of liberty.

The well merited popularity of the *Spirit of Laws* gave the first fatal blow to the study of *Natural Jurisprudence*; partly by the proofs which, in every page, the work afforded, of the absurdity of all schemes of Universal Legislation; and partly by the attractions which it possessed, in point of eloquence and taste, when contrasted with the insupportable dulness of the systems then in possession of the schools. It is remarkable, that Montesquieu has never once mentioned the name of Grotius;—in *this*, probably, as in numberless other instances, conceiving it to be less expedient to attack established prejudices openly and in front, than gradually to undermine the unsuspected errors upon which they rest.

If the foregoing details should appear tedious to some of my readers, I must request them to recollect, that they relate to a science which, for much more than a hundred years, constituted the whole philosophy, both ethical and political, of the largest portion of civilized Europe. With

Scotland in our times,” was but a *reflection*, though with a far steadier and more concentrated force, from the scattered but brilliant sparks kindled by the genius of Montesquieu. I shall afterwards have occasion to take notice of the mighty influence which his writings have had on the subsequent history of Scottish literature.

respect to Germany, in particular, it appears from the Count de Hertzberg, that this science continued to maintain its undisputed ground, till it was supplanted by that growing passion for Statistical details, which, of late, has given a direction so different, and in some respects so opposite, to the studies of his countrymen.¹

When from Germany we turn our eyes to the south of Europe, the prospect seems not merely sterile, but afflicting and almost hopeless. Of Spanish literature I know nothing but through the medium of Translations; a very imperfect one, undoubtedly, when a judgment is to be passed on compositions addressed to the powers of imagination and taste; yet fully sufficient to enable us to form an estimate of works which treat of science and philosophy. On such subjects, it may be safely concluded, that whatever is unfit to stand the test of a literal version, is not worth the trouble of being studied in the original. The progress of the Mind in Spain during the seventeenth century, we may therefore confidently pronounce, if not entirely suspended, to have been too inconsiderable to merit attention.

“The only good book,” says Montesquieu, “which the Spaniards have to boast of, is that which exposes the absurdity of all the rest.” In this remark, I have little doubt that there is a considerable sacrifice of truth to the pointed effect of an antithesis. The unqualified censure, at the same time, of this great man, is not unworthy of notice, as a strong expression of his feelings with respect to the general insignificance of the Spanish writers.

¹ “La connoissance des états qu’on se plaît aujourd’hui d’appeller *Statistique*, est une de ces sciences qui sont devenues à la mode, et qui ont pris une vogue générale depuis quelques années; elle a presque dépossédé celle du Droit Public, qui régnoit au commencement et jusques vers le milieu du siècle présent.” *Reflexions sur la Force des Etats*. Par M. le Comte de Hertzberg. Berlin, 1782.

The inimitable work here referred to by Montesquieu, is itself entitled to a place in this Discourse, not only as one of the happiest and most wonderful creations of Human fancy, but as the record of a force of character, and an enlargement of mind, which, when contrasted with the prejudices of the author's age and nation, seem almost miraculous. It is not merely against Books of Chivalry that the satire of Cervantes is directed. Many other follies and absurdities of a less local and temporary nature have their share in his ridicule ; while not a single expression escapes his pen that can give offence to the most fastidious moralist. Hence those amusing and interesting contrasts by which Cervantes so powerfully attaches us to the hero of his story ; chastising the wildest freaks of a disordered imagination, by a stateliness yet courtesy of virtue, and (on all subjects but one) by a superiority of good sense and of philosophical refinement, which, even under the most ludicrous circumstances, never cease to command our respect and to keep alive our sympathy.

In Italy, notwithstanding the persecution undergone by Galileo, physicks and astronomy continued to be cultivated with success by Torricelli, Borelli, Cassini, and others ; and in pure geometry, Viviani rose to the very first eminence, as the Restorer, or rather as the Diviner of ancient discoveries ; but, in all those studies which require the animating spirit of civil and religious liberty, this once renowned country exhibited the most melancholy symptoms of mental decrepitude. "Rome," says a French historian, "was too much interested in maintaining her principles, not to raise every imaginable barrier against what might destroy them. Hence that *index* of prohibited books, into which were put the history of the President de Thou ; the works on the liberties of the Gallican church ; and (who could have believed it ?) the translations of the Holy Scrip-

tures. Meanwhile, this tribunal, though always ready to condemn judicious authors upon frivolous suspicions of heresy, approved those seditious and fanatical theologists, whose writings tended to the encouragement of regicide, and the destruction of government. The approbation and censure of books (it is justly added) deserve a place in the history of the human mind."

The great glory of the Continent, towards the end of the seventeenth century (I except only the philosophers of France) was Leibnitz. He was born as early as 1646; and distinguished himself, while still a very young man, by a display of those talents which were afterwards to contend with the united powers of Clarke and of Newton. I have already introduced his name among the writers on Natural Law; but, in every other respect, he ranks more fitly with the contemporaries of his old age than with those of his youth. My reasons for thinking so will appear in the sequel. In the mean time, it may suffice to remark, that Leibnitz, the Jurist, belongs to one century, and Leibnitz, the Philosopher, to another.

In this, and other analogous distributions of my materials, as well as in the order I have followed in the arrangement of particular facts, it may be proper, once for all, to observe, that much must necessarily be left to the *discretionary*, though not to the *arbitrary* decision of the author's judgment;—that the dates which separate from each other the different stages in the progress of Human Reason, do not, like those which occur in the history of the exact sciences, admit of being fixed with chronological and indisputable precision; while, in adjusting the perplexed rights of the innumerable claimants in this intellectual and shadowy region, a task is imposed on the writer, resembling not unfrequently the labour of *him*, who should have attempted to circumscribe, by mathematical lines, the melting and intermingling colours of Arachne's web;

In quo diversi niteant cum mille colores,
'Transitus ipse tamen spectantia lumina fallunt,
Usque adeo quod tangit idem est, tamen ultima distant.

But I will not add to the number (already too great) of the foregoing pages, by anticipating, and attempting to obviate, the criticisms to which they may be liable. Nor will I dissemble the confidence with which, amid a variety of doubts and misgivings, I look forward to the candid indulgence of those who are best fitted to appreciate the difficulties of my undertaking. I am certainly not prepared to say with Johnson, that "I dismiss my work with frigid indifference, and that to me success and miscarriage are empty sounds." My feelings are more in unison with those expressed by the same writer in the conclusion of the admirable preface to his edition of Shakspeare. One of his reflections, more particularly, falls in so completely with the train of my own thoughts, that I cannot forbear, before laying down the pen, to offer it to the consideration of my readers.

"Perhaps I may not be more censured for doing wrong, than for doing little; for raising in the publick, expectations, which at last I have not answered. The expectation of ignorance is indefinite, and that of knowledge is often tyrannical. It is hard to satisfy those who know not what to demand, or those who demand by design what they think impossible to be done."

NOTES AND ILLUSTRATIONS.

THE chief purpose of these Notes and Illustrations, is to verify some of the more important views contained in the foregoing Historical Sketch. The errors into which I have frequently been led by trusting to the information of writers, who, in describing philosophical systems, profess to give merely the general results of their researches, unauthenticated by particular references to the original sources, have long convinced me of the propriety, on such occasions, of bringing under the eye of the reader, the specific authorities on which my statements proceed. Without such a check, the most faithful historian is perpetually liable to the suspicion of accommodating facts to his favourite theories; or of unconsciously blending with the opinions he ascribes to others, the glosses of his own imagination. The quotations in the following pages, selected principally from books not now in general circulation, may, I hope, at the same time, be useful in facilitating the labours of those who shall hereafter resume the same subject, on a scale more susceptible of the minuteness of literary detail.

For a few short biographical digressions, with which I have endeavoured to give somewhat of interest and relief to the abstract and unattractive topics which occupy so great a part of my discourse, I flatter myself that no apology is necessary; more especially, as these digressions will, in general, be found to throw some additional light on the philosophical or the political principles of the individuals to whom they relate.

NOTE A, p. 37.

Sir Thomas More, though, towards the close of his life, he became "a persecutor even unto blood, defiling with cruelties those hands which were never polluted with bribes," was, in his

¹ Burnet.

earlier and better days, eminently distinguished by the humanity of his temper, and the liberality of his opinions. Abundant proofs of this may be collected from his letters to Erasmus; and from the sentiments, both religious and political, indirectly inculcated in his *Utopia*. In contempt for the ignorance and profligacy of the monks, he was not surpassed by his correspondent; and against various superstitions of the Romish church, such as the celibacy of priests, and the use of images in worship, he has expressed himself more decidedly than could well have been expected from a man placed in his circumstances. But *these* were not the whole of his merits. His ideas on Criminal Law are still quoted with respect by the advocates for a milder code than has yet been introduced into this country; and, on the subject of toleration, no modern politician has gone farther than his Utopian Legislators.

The disorders occasioned by the rapid progress of the Reformation, having completely shaken his faith in the sanguine speculations of his youth, seem at length, by alarming his fears as to the fate of existing establishments, to have unhinged his understanding, and perverted his moral feelings. The case was somewhat the same with his friend Erasmus, who (as Jortin remarks) "began in his old days to act the zealot and the missionary with an ill grace, and to maintain, that there were *certain* hereticks, who might be put to death as blasphemers and rioters." (pp. 428, 481.) In the mind of Erasmus, other motives, it is not improbable, concurred; his biographer and apologist being forced to acknowledge that "he was afraid lest Francis, and Charles, and Ferdinand, and George, and Henry VIII, and other persecuting princes, should suspect that he condemned their cruel conduct." Ibid. p. 481.

Something, it must at the same time be observed, may be alleged in behalf of these two illustrious persons; *not*, indeed, in extenuation of their unpardonable defection from the cause of religious liberty, but of their estrangement from some of their old friends, who scrupled not to consider, as apostates and traitors, all those who, while they acknowledged the expediency of ecclesiastical reform, did not approve of the violent measures employed for the accomplishment of that object. A very able and candid argument on this point may be found in Bayle, Article *Castellan*, Note Q.

NOTE B, p. 39.

The following short extract will serve to convey a general idea of Calvin's argument upon the subject of usury.

“Pecunia non parit pecuniam. Quid mare? quid domus, ex ejus locatione pensionem percipio? an ex tectis et parietibus argentum proprie nascitur? Sed et terra producit, et mari advehitur quod pecuniam deinde producat, et habitationis commoditas cum certa pecunia parari commutarive solet. Quod si igitur plus ex negotiatione lucri percipi possit, quam ex fundi cujusvis proventu: an feretur qui fundum sterilem fortasse colono locaverit ex quo mercedem vel proventum recipiat sibi, qui ex pecunia fructum aliquem perceperit, non feretur? et qui pecunia fundum acquirit, annon pecunia illa generat alteram annuam pecuniam? Unde vero mercatoris lucrum? Ex ipsius, inquires, diligentia atque industria. Quis dubitat pecuniam vacuum inutilem omnino esse? neque qui à me mutuam rogat, vacuum apud se habere à me acceptam cogitat. Non ergo ex pecunia illa lucrum accedit, sed ex proventu. Illae igitur rationes subtiles quidem sunt, et speciem quandam habent, sed ubi propius expenduntur, reipsa concidunt. Nunc igitur concludo, judicandum de usuris esse, non ex particulari aliquo Scripturae loco, sed tantum ex aequitatis regula.” *Calvini Epistolae.*

NOTE C, p. 54.

The prevailing idea among Machiavel's contemporaries and immediate successors certainly was, that the design of *the Prince* was hostile to the rights of mankind; and that the author was either entirely unprincipled, or adapted his professed opinions to the varying circumstances of his own eventful life. The following are the words of Bodinus, born in 1530, the very year when Machiavel died; an author whose judgment will have no small weight with those who are acquainted with his political writings: “Machiavel s'est bien fort mésconté, de dire que l'estat populaire est le meilleur: ¹ et néanmoins ayant oublié sa première opinion, il a tenu en un autre lieu, ² que pour restituer l'Italie en sa liberté, il faut qu'il n'y ait qu'un Prince; et de fait, il s'est efforcé de former un estat le plus tyrannique du monde; et en autre lieu ³ il confesse, que l'estat de Venice est le plus beau de tous, lequel est une pure Aristocratie, s'il en fût ouques: tellement qu'il ne scait à quoi se tenir.” (*De la République*, Liv. vi, chap. iv. Paris, 1576.) In the Latin version of the above passage, the author applies to Machiavel the, *Homo levissimus ac nequissimus*.

One of the earliest apologists for Machiavel was Albericus Gentilis, an Italian author, of whom some account will be given

¹ Discourses upon Livy.

² *Prince*, Book i, c. ix.

³ Discourses upon Livy.

afterwards. His words are these: "Machiavel, a warm panegyrist and keen assertor of democracy; born, educated, promoted under a republican government, was in the highest possible degree hostile to tyranny. The scope of his work, accordingly, is not to instruct tyrants; but, on the contrary, by disclosing their secrets to their oppressed subjects, to expose them to public view, stripped of all their trappings." He afterwards adds, that "Machiavel's real design was, under the mask of giving lessons to sovereigns, to open the eyes of the people; and that he assumed this mask in the hope of thereby securing a freer circulation to his doctrines." (*De Legationibus*, Lib. iii, c. ix. Lond. 1585.) The same idea was afterwards adopted and zealously contended for by Wicquefort, the author of a noted book entitled the *Ambassador*; and by many other writers of a later date. Bayle, in his *Dictionary*, has stated ably and impartially the arguments on both sides of the question; evidently leaning however very decidedly, in his own opinion, to that of Machiavel's Apologists.

The following passage from the excellent work of M. Sismondi on the Literature of the South, appears to me to approach very near to the truth, in the estimate it contains both of the spirit of the *Prince*, and of the character of the author. "The real object of Machiavel cannot have been to confirm upon the throne a tyrant whom he detested, and against whom he had already conspired; nor is it more probable that he had a design to expose to the people the maxims of tyranny, in order to render them odious. Universal experience made them at that time sufficiently known to all Italy; and that infernal policy which Machiavel reduced to principles, was, in the sixteenth century, practised by every government. There is rather, in his manner of treating it, a universal bitterness against mankind; a contempt of the whole human race; which makes him address them in the language to which they had debased themselves. He speaks to the interests of men, and to their selfish calculations, as if he thought it useless to appeal to their enthusiasm or to their moral feelings."

I agree perfectly with M. de Sismondi in considering the two opposite hypotheses referred to in the above extract, as alike untenable; and have only to add to his remarks, that, in writing the *Prince*, the author seems to have been more under the influence of spleen, of ill humour, and of blasted hopes, than of any deliberate or systematical purpose, either favourable or adverse to human happiness. The prevailing sentiment in his mind probably was, *Si populus vult decipi, decipiatur*.¹

¹ Many traces of this misanthropick disposition occur in the historical and even in the dramatick works of Machiavel. It is very

According to this view of the subject, Machiavel's *Prince*, instead of being considered as a new system of political morality, invented by himself, ought to be regarded merely as a digest of the maxims of state policy then universally acted upon in the Italian courts. If I be not mistaken, it was in this light that the book was regarded by Lord Bacon, whose opinion concerning it being, in *one* instance, somewhat ambiguously expressed, has been supposed by several writers of note (particularly Bayle and Mr. Roscoe) to have coincided with that quoted above from Albericus Gentilis. To me it appears, that the very turn of the sentence appealed to on this occasion is rather disrespectful than otherwise to Machiavel's character. "Est itaque quod gratias agamus Machiavellio et *hujusmodi scriptoribus*, qui aperte et indissimulanter proferunt, quid homines facere soleant, non quid debeant." (*De Aug. Scient. Lib. vii, cap. ii.*) The best comment, however, on these words, is to be found in another passage of Bacon, where he has expressed his opinion of Machiavel's moral demerits in terms as strong and unequivocal as language can furnish. "Quod enim ad *malas artes* attinet; si quis Machiavellio se dederit in disciplinam; qui praecipit," &c. &c. See the rest of the paragraph (*De Aug. Scient. Lib. viii, cap. ii.*) See also a passage in Book vii, chap. viii, beginning thus: "An non et hoc verum est, juvenes multo minus *Politicae* quam *Ethicae* auditores idoneos esse, antequam religione et doctrina de moribus et officiis plene imbuantur; ne forte judicio depravati et corrupti, in eam opinionem veniant, non esse rerum differentias morales veras et solidas, sed omnia ex utilitate.—Sic enim Machiavellio dicere placet, *Quod si contigisset Caesarem bello superatum fuisse, Catilina ipso fuisset odiosior*," &c. &c. After these explicit and repeated declarations of his sentiments on this point, it is hard that Bacon should have been numbered among the apologists of Machiavel, by such high authorities as Bayle, and the excellent biographer of Lorenzo de Medicis.

NOTE D, p. 66.

The charge of plagiarism from Bodin has been urged somewhat indelicately against Montesquieu, by a very respectable writer, the Chevalier de Filangieri. "On a cru, et l'on croit peut-être encore, que Montesquieu, a parlé le premier de l'influence du climat. Cette opinion est une erreur. Avant lui, le délicat et ingénieux Fontenelle s'étoit exercé sur set objet. Ma-

justly observed by M. de Sismondi, that "the pleasantry of his comedies is almost always mingled with gall. His laughter at the human race is but the laughter of contempt."

chiavel, en plusieurs endroits de ses ouvrages, parle aussi de cette influence du climat sur le physique et sur le moral des peuples. Chardin, un de ces voyageurs qui savent observer, a fait beaucoup de réflexions sur l'influence physique et moral des climats. L'Abbé Dubos a soutenu et développé les pensées de Chardin; et Bodin, qui peut-être avoit lu dans Polybe que le climat détermine les formes, la couleur, et les mœurs des peuples, en avoit déjà fait, cent cinquante ans auparavant, la base de son système, dans son livre de la République, et dans sa Méthode de l'Histoire. Avant tous ces écrivains, l'immortel Hippocrate avoit traité fort au long cette matière dans son fameux ouvrage *de l'air, des eaux, et des lieux*. L'Auteur de l'Esprit des Lois, sans citer un seul de ces philosophes, établit à son tour un système; mais il ne fit qu'altérer les principes d'Hippocrate, et donner une plus grande extension aux idées de Dubos, de Chardin, et de Bodin. Il voulut faire croire au public qu'il avoit eu le premier quelques idées sur ce sujet; et le public l'en crut sur sa parole." *La Science de la Législation, ouvrage traduit de l'Italien*. Paris, 1786. Tom. I, pp. 225, 226.

The enumeration here given of writers whose works are in every body's hands, might have satisfied Filangieri, that, in giving his sanction to this old theory, Montesquieu had no wish to claim to himself the praise of originality. It is surprising, that, in the foregoing list, the name of Plato should have been omitted, who concludes his fifth book, *De Legibus*, with remarking, that "all countries are not equally susceptible of the same sort of discipline; and that a wise legislator will pay a due regard to the diversity of national character, arising from the influence of climate and of soil." It is not less surprising, that the name of Charron should have been overlooked, whose observations on the moral influence of physical causes, discover as much originality of thought as those of any of his successors. See *De la Sagesse*, Livre i, chap. xxxvii.

NOTE E, p. 70.

Innumerable instances of Luther's credulity and superstition are to be found in a book entitled *Martini Lutheri Colloquia Mensalia*, &c. first published (according to Bayle) in 1571. The only copy of it which I have seen, is a translation from the German into the English tongue by Captain Henrie Bell. (London, 1652.) This work, in which are "gathered up the fragments of the divine discourses which Luther held at his table with Philip Melanchthon, and divers other learned men," bears to have been originally collected "out of his holy mouth" by

Dr. Anthony Lauterbach, and to have been afterwards “digested into commonplaces” by Dr. Aurifaber. Although not sanctioned with Luther’s name, I do not know that the slightest doubts of its details have been suggested, even by such of his followers as have regretted the indiscreet communication to the publick, of his unreserved *table talk* with his confidential companions. The very accurate Seckendorff has not called in question its authenticity; but, on the contrary, gives it his indirect sanction, by remarking, that it was collected with little prudence, and not less imprudently printed: “*Libro Colloquiorum Mensalium minus quidem cautè composito et vulgato.*” (Bayle, Article Luther, Note L.) It is very often quoted as an authority by the candid and judicious Dr. Jortin.

In confirmation of what I have said of Luther’s credulity, I shall transcribe, in the words of the English translator, the substance of one of Luther’s *Divine Discourses*, “concerning the devil and his works.” “The devil (said Luther) can transform himself into the shape of a man or a woman, and so deceiveth people; insomuch that one thinketh he lieth by a right woman, and yet is no such matter; for, as St. Paul saith, the devil is strong by the child of unbelief. But insomuch as children or devils are conceived in such sort, the same are very horrible and fearful examples. Like unto this it is also with what they call the *Nix* in the water, who draweth people unto him as maids and virgins, of whom he begetteth devil’s children. The devil can also steal children away; as sometimes, children within the space of six weeks after their birth are lost, and other children called *supposititi*, or changelings, laid in their places. Of the Saxons they were called *Killcrops*.

“Eight years since,” said Luther, “at *Dessau*, I did see and touch such a changed child, which was twelve years of age; he had his eyes, and all members, like another child; he did nothing but feed, and would eat as much as two clowns were able to eat. I told the Prince of Anhalt, if I were prince of that country, I would venture *homicidium* thereon, and would throw it into the river Moldaw. I admonished the people dwelling in that place devoutly to pray to God to take away the devil. The same was done accordingly, and the second year after the changeling died.

“In Saxony, near unto Halberstad, was a man that also had a *killcrop*, who sucked the mother and five other women dry, and besides devoured very much. This man was advised that he should, in his pilgrimage at Halberstad, make a promise of the *killcrop* to the Virgin Marie, and should cause him there to be rocked. This advice the man followed, and carried the changeling thither in a basket. But going over a river, being upon the

bridge, another devil that was below in the river, called and said, *Killcrop! Killcrop!* Then the child in the basket (which never before spake one word,) answered, Ho, ho. The devil in the water asked further, Whither art thou going? The child in the basket said, I am going towards Hocklestad to our loving mother, to be rocked. The man being much affrighted thereat, threw the child with the basket, over the bridge into the water. Whereupon the two devils flew away together, and cried Ho, ho, ha, tumbling themselves over one another, and so vanished." (pp. 386, 387.)

With respect to Luther's Theological Disputes with the Devil, see the passages quoted by Bayle, Art. *Luther*, Note U.

Facts of this sort, so recent in their date, and connected with the history of so great a character, are consolatory to those, who, amid the follies and extravagancies of their contemporaries, are sometimes tempted to despair of the cause of truth, and of the gradual progress of human reason.

NOTE F, p. 94.

Ben Jonson is one of the few contemporary writers by whom the transcendent genius of Bacon appears to have been justly appreciated; and the only one I know of, who has transmitted any idea of his forensick eloquence; a subject on which, from his own professional pursuits, combined with the reflecting and philosophical cast of his mind, Jonson was peculiarly qualified to form a competent judgment. "There happened," says he "in my time, one noble speaker, who was full of gravity in his speaking. No man ever spoke more neatly, more pressly, more weightily, or suffered less emptiness, less idleness in what he uttered. No member of his speech but consisted of its own graces. His hearers could not cough, or look aside from him without loss. He commanded where he spoke, and had his judges angry and pleased at his devotion. The fear of every man that heard him was, that he should make an end." No finer description of the perfection of this art is to be found in any author, ancient or modern.

The admiration of Jonson for Bacon (whom he appears to have known intimately)¹ seems almost to have blinded him to those indelible shades in his fame, to which, even at this distance of time, it is impossible to turn the eye without feelings of

¹ Jonson is said to have translated into Latin great part of the books *De Augmentis Scientiarum*. Dr. Warton states this (I do not know on what authority) as an undoubted fact. *Essay on the Genius and Writings of Pope*.

sorrow and humiliation. Yet it is but candid to conclude, from the posthumous praise lavished on him by Jonson and by Sir Kenelm Digby,¹ that the servility of the courtier, and the laxity of the judge, were, in the relations of private life, redeemed by many estimable and amiable qualities. That man must surely have been marked by some rare features of moral as well as of intellectual greatness, of whom, long after his death, Jonson could write in the following words.

“My conceit of his person was never increased toward him by his place or honours; but I have and do reverence him, for the greatness that was only proper to himself, in that he seemed to me ever, by his works, one of the greatest men, and most worthy of admiration, that had been in many ages. In his adversity, I ever prayed that God would give him strength, for greatness he could not want. Neither could I condole in a word or syllable for him, as knowing no accident could do harm to virtue, but rather help to make it manifest.”

In Aubrey's anecdotes of Bacon,³ there are several particulars not unworthy of the attention of his future biographers. One expression of this writer is more peculiarly striking: “In short, all that were *great and good* loved and honoured him.” When it is considered, that Aubrey's knowledge of Bacon was derived chiefly through the medium of Hobbes, who had lived in habits of the most intimate friendship with both, and whose writings shew that he was far from being an idolatrous admirer of Bacon's philosophy, it seems impossible for a candid mind, after reading the foregoing short but comprehensive eulogy, not to feel a strong inclination to dwell rather on the fair than on the dark side of the Chancellor's character, and, before pronouncing an unqualified condemnation, carefully to separate the faults of the age from those of the individual.

An affecting allusion of his own, in one of his greatest works, to the errors and misfortunes of his publick life, if it does not atone for his faults, may, at least, have some effect in softening the asperity of our censures. “*Ad literas potius quam ad aliud quicquam natus, et ad res gerendas nescio quo fato contra genium suum abreptus.*” *De Aug. Sc. L. viii, c. iii.*

Even in Bacon's professional line, it is now admitted, by the best judges, that he was greatly underrated by his contemporaries. “The Queen did acknowledge,” says the Earl of Essex, in a letter to Bacon himself, “you had a great wit, and an ex-

¹ See his letters to M. de Fermat, printed at the end of Fermat's *Opera Mathematica*, Tolosae, 1679.

² Lately published in the extracts from the Bodleian library.

cellent gift of speech, and much other good learning. But *in law*, she rather thought you could make shew, to the utmost of your knowledge, than that you were deep."

"If it be asked," says Dr. Hurd, "how the Queen came to form this conclusion, the answer is plain. It was from Mr. Bacon's having a great wit, an excellent gift of speech, and much other good learning." Hurd's *Dialogues*.

The following testimony to Bacon's legal knowledge (pointed out to me by a learned friend) is of somewhat more weight than Queen Elizabeth's judgment against it: "What might we not have expected," says Mr. Hargrave, after a high encomium on the powers displayed by Bacon in his '*Reading on the Statute on Uses*,' "what might we not have expected from the hands of such a master, if his vast mind had not so embraced within its compass the whole field of science, as very much to detach him from professional studies!"

It was probably owing in part to his court disgrace, that so little notice was taken of Bacon, for some time after his death, by those English writers who availed themselves, without any scruple, of the lights struck out in his works. A very remarkable example of this occurs in a curious, though now almost forgotten book (published in 1627,) entitled, *An Apology or Declaration of the Power and Providence of God in the Government of the World*, by George Hakewill, D. D. Archdeacon of Surrey. It is plainly the production of an uncommonly liberal and enlightened mind; well stored with various and choice learning, collected both from ancient and modern authors. Its general aim may be guessed at from the text of Scripture prefixed to it as a motto, "Say not thou, what is the cause that the former days are better than these, for thou dost not inquire wisely concerning this;" and from the words of Ovid, so happily applied by Hakewill to the "common error touching the golden age,"

Prisca juvent alios, ego me nunc denique natum
Gratulor.

That the general design of the book, as well as many incidental observations contained in it, was borrowed from Bacon, there cannot, I apprehend, be a doubt; and yet I do not recollect more than one or two references (and these very slight ones) to his writings, through the whole volume. One would naturally have expected, that, in the following passage of the epistle dedicatory, the name of the late unfortunate Chancellor of England, who had died in the course of the preceding year, might have found a place along with the other *great clerks* there enumerated: "I do not believe that all regions of the world, or all

ages in the same region, afford wits always alike; but *this* I think (neither is it my opinion alone, but of Scaliger, Vives, Budæus, Bodin, and other *great clerks*;) that the wits of these latter ages, being manured by industry, directed by precepts, and regulated by method, may be as capable of deep speculations, and produce as masculine and lasting births, as any of the ancient times have done. But if we conceive them to be giants, and ourselves dwarfs; if we imagine all sciences already to have received their utmost perfection, so as we need not but translate and comment on what they have done, surely there is little hope that we should ever come near them, much less match them. The first step to enable a man to the achieving of great designs, is to be persuaded that he is able to achieve them; the next, not to be persuaded, that whatsoever hath not yet been done, cannot therefore *be* done. Not any one man, or nation, or age, but rather *mankind* is it, which, in latitude of capacity, answers to the universality of things to be known." In another passage, Hakewill observes, that, "if we will speak properly and punctually, antiquity rather consists in the old age, than in the infancy or youth of the world." I need scarcely add, that some of the foregoing sentences are almost literal transcripts of Bacon's words.

The philosophical fame of Bacon in his own country may be dated from the establishment of the Royal Society of London; by the founders of which, as appears from their colleague, Dr. Sprat, he was held in so high estimation, that it was once proposed to prefix to the history of their labours some of Bacon's writings, as the best comment on the views with which they were undertaken. Sprat himself, and his illustrious friend Cowley, were among the number of Bacon's earliest eulogists; the latter, in an Ode to the Royal Society, too well known to require any notice here; the former, in a very splendid passage of his History, from which I shall borrow a few sentences, as a conclusion and ornament to this note.

"For, is it not wonderful, that he who had run through all the degrees of that profession, which usually takes up men's whole time; who had studied, and practised, and governed the common law; who had always lived in the crowd, and born the greatest burden of civil business; should yet find leisure enough for these retired studies, to excel all those men, who separate themselves for this very purpose? He was a man of strong, clear, and powerful imaginations; his genius was searching and inimitable; and of this I need give no other proof than his style itself; which as, for the most part, it describes men's minds, as well as pictures do their bodies, so it did his above all men living. The course of it vigorous and majestic; the wit bold

and familiar; the comparisons fetched out of the way, and yet the more easy: ¹ In all expressing a soul equally skilled in men and nature."

NOTE G, p. 99.

The paradoxical bias of Hobbes's understanding is never so conspicuous as when he engages in physical or in mathematical discussions. On such occasions, he expresses himself with even more than his usual confidence and arrogance. Of the Royal Society (*the Virtuosi*, as he calls them, *that meet at Gresham College*) he writes thus: "Convenient, studia conferant, experimenta faciant quantum volunt, nisi et principiis utantur meis, nihil proficient." And elsewhere: "Ad causas autem propter quas proficere ne paullum quidem potuistis nec poteritis, accedunt etiam alia, ut odium Hobbii, quia nimium libere scripserat de academiis veritatem: Nam ex eo tempore irati physici et mathematici veritatem ab eo venientem non recepturos se palam professi sunt." In his English publications, he indulges in a vein of coarse scurrility, of which his own words alone can convey any idea. "So go your ways," says he, addressing himself to Dr. Wallis and Dr. Seth Ward, two of the most eminent mathematicians then in England, "you uncivil *secclesiasticks*, inhuman *divines*, de-doctors of morality, unasinous colleagues, egregious pair of *Issachars*, most wretched *indices and vindices academiarum*; and remember Vespasian's law, *that it is unlawful to give ill language first, but civil and lawful to return it.*"

NOTE H, p. 102.

With respect to the *Leviathan*, a very curious anecdote is mentioned by Lord Clarendon. "When I returned," says he, "from Spain, by Paris, Mr. Hobbes frequently came to me, and told me that his book, which he would call *Leviathan*, was then printing in England, and that he received every week a sheet to correct; and thought it would be finished within a little more than a month. He added, that he knew when I read the book I would not like it; and thereupon mentioned some conclusions; upon which I asked him why he would publish such doctrines; to which, after a discourse between jest and earnest, he said,

¹ By the word *easy*, I presume Sprat here means the native and spontaneous growth of Bacon's own fancy, in opposition to the traditional similes borrowed by common place writers from their predecessors.

"*The truth is, I have a mind to go home.*" In another passage, the same writer expresses himself thus: "The review and conclusion of the *Leviathan* is, in truth, a sly address to Cromwell, that, being out of the kingdom, and so being neither conquered nor his subject, he might by his return submit to his government, and be bound to obey it. This review and conclusion he made short enough to hope that Cromwell might read it; where he should not only receive the pawn of this new subject's allegiance, by declaring his own obligations and obedience; but by publishing such doctrines, as, being diligently infused by such a master in the art of government, might secure the people of the kingdom (over whom he had no right to command) to acquiesce and submit to his brutal power."

That there is no exaggeration or misrepresentation of facts in these passages, with the view of injuring the character of Hobbes, may be confidently presumed from the very honourable testimony which Clarendon bears, in another part of the same work, to his moral as well as intellectual merits. "Mr. Hobbes," he observes, "is a man of excellent parts; of great wit; of some reading; and of somewhat more thinking; one who has spent many years in foreign parts and observations; understands the learned as well as modern languages; hath long had the reputation of a great philosopher and mathematician; and in his age hath had conversation with many worthy and extraordinary men. In a word, he is one of the most ancient acquaintance I have in the world, and of whom I have always had a great esteem, as a man, who, besides his eminent learning and knowledge, hath been always looked upon as a man of probity, and of a life free from scandal."

NOTE I, p. 141.

It is not easy to conceive how Descartes reconciled, to his own satisfaction, his frequent use of the word *substance*, as applied to the mind, with his favourite doctrine, that the *essence* of the mind consists in *thought*. Nothing can be well imagined more unphilosophical than this last doctrine, in whatever terms it is expressed; but to designate by the name of *substance*, what is also called *thought*, in the course of the same argument, renders the absurdity still more glaring than it would otherwise have been.

I have alluded, in the text, to the difference between the popular and the scholastick notion of *substance*. According to the latter, the word *substance* corresponds to the Greek word *ουσια*, as employed by Aristotle to denote the first of the predicaments;

in which technical sense it is said, in the language of the schools, to signify *that* which supports attributes, or which is *subject to accidents*. At a period when every person liberally educated was accustomed to this barbarous jargon, it might not appear altogether absurd to apply the term *substance* to the human soul, or even to the Deity. But, in the present times, a writer who should so employ it may be assured, that, to a great majority of his readers, it will be no less puzzling than it was to Crambe, in Martinus Scriblerus, when he first heard it thus defined by his master Cornelius.¹ How extraordinary does the following sentence now sound even to a philosophical ear! and yet it is copied from a work published little more than seventy years ago, by the learned and judicious Gravesande: "*Substantiae sunt aut cogitantes, aut non cogitantes; cogitantes duas novimus, Deum et mentem nostram. Duae etiam substantiae, quae non cogitant, nobis notae sunt, spatium et corpus.*" *Introd. ad Phil.*

19.

The Greek word *ουσια* (derived from the participle of *υπει*) is not liable to these objections. It obtrudes no sensible image on the fancy; and in this respect, has a great advantage over the Latin word *substantia*. The former, in its logical acceptation, is an extension to Matter, of an idea originally derived from Mind. The latter is an extension to Mind of an idea originally derived from Matter.

Instead of defining *mind* to be a thinking *substance*, it seems much more logically correct to define it a thinking *being*. Perhaps it would be better still, to avoid, by the use of the pronoun *that*, any substantive whatever, "Mind is *that* which thinks, wills," &c.

The foregoing remarks afford me an opportunity of exemplifying what I have elsewhere observed concerning the effects which the scholastick philosophy has left on the present habits of thinking, even of those who never cultivated that branch of learning. In consequence of the stress laid on the *predicaments*, men became accustomed in their youth to imagine, that, in order to know the nature of any thing, it was sufficient to know under what *predicament* or *category* it ought to be arranged; and that, till this was done, it remained to our faculties a subject merely

¹ "When he was told, a *substance* was that which was *subject to accidents*, then soldiers, quoth Crambe, are the most substantial people in the world." Let me add, that, in the list of Philosophical reformers, the authors of Martinus Scriblerus ought not to be overlooked. Their happy ridicule of the scholastick Logick and Metaphysicks is universally known; but few are aware of the acuteness and sagacity displayed in their allusions to some of the most vulnerable passages in Locke's Essay. In this part of the work it is commonly understood that Arbuthnot had the principal share.

of ignorant wonder. Hence the impotent attempt to comprehend under some common name (such as that of *substance*) the heterogeneous existences of *matter*, of *mind*, and even of *empty space*; and hence the endless disputes to which the last of these words has given rise in the Schools.

In our own times, Kant and his followers seem to have thought, that they had thrown a new and strong light on the nature of *space*, and also of *time*, when they introduced the word *forms* (*forms of the intellect*) as a common term applicable to both. Is not this to revert to the scholastick folly of verbal generalization? And is it not evident, that of things which are *unique* (such as *matter*, *mind*, *space*, *time*) no classification is practicable? Indeed, to speak of classifying what has nothing in common with any thing else, is a contradiction in terms. It was thus that St. Augustine felt, when he said, “*Quid sit tempus, si nemo quaerat a me, scio; si quis interroget, nescio.*” His idea evidently was, that, although he annexed as clear and precise a notion to the word *time*, as he could do to any object of human thought, he was unable to find any term more general, under which it could be comprehended; and consequently, unable to give any definition, by which it might be explained.

NOTE K, p. 142.

“Les Méditations de Descartes parurent en 1641. C'étoit, de tous ses ouvrages, celui qu'il estimoit le plus. Ce qui caractérise sur tout cet ouvrage, c'est qu'il contient sa fameuse démonstration de Dieu par l'idée, démonstration si répétée depuis, adoptée par les uns, et rejetée par les autres; et qu'il est le premier où la distinction de l'esprit et de la matière soit parfaitement développée, car avant Descartes on n'avoit encore bien approfondi les preuves philosophiques de la spiritualité de l'ame.” *Eloge de Descartes*, par M. Thomas. Note 20.

If the remarks in the text be correct, the characteristic merits of Descartes' *Meditations* do not consist in the novelty of the proofs contained in them of the *spirituality* of the soul (on which point Descartes has added little or nothing to what had been advanced by his predecessors,) but in the clear and decisive arguments by which they expose the absurdity of attempting to explain the mental phenomena, by analogies borrowed from those of matter. Of this distinction, neither Thomas, nor Turgot, nor D'Alembert, nor Condorcet, seem to have been at all aware.

I quote from the last of these writers an additional proof of the confusion of ideas upon this point, still prevalent among the most acute logicians. “*Ainsi la spiritualité de l'ame, n'est pas une*

opinion qui ait besoin de preuves, mais le résultat simple et naturel d'une analyse exacte de nos idées, et de nos facultés." (*Vie de M. Turgot.*) Substitute for *spirituality* the word *immateriality*, and the observation becomes equally just and important.

NOTE L, p. 143.

The following extract from Descartes might be easily mistaken for a passage in the *Novum Organon*.

"Quoniam infantes nati sumus, et varia de rebus sensibilibus judicia prius tulimus, quam integrum nostrae rationis usum haberemus, multis praejudiciis a veri cognitione avertimur, quibus non aliter videmur posse liberari, quam si semel in vitâ, de iis omnibus studeamus dubitare, in quibus vel minimam incertitudinis suspicionem reperiemus.

"Quin et illa etiam, de quibus dubitabimus, utile erit habere pro falsis, ut tanto clarius, quidnam certissimum et cognitu facillimum sit, inveniamus.

"Itaque ad serio philosophandum, veritatemque omnium rerum cognoscibilium indagandam, primò omnia praejudicia sunt deponenda; sive accuratè est cavendum, ne ullis ex opinionibus olim à nobis receptis fidem habeamus, nisi prius, iis ad novum examen revocatis, veras esse comperiamus." *Princ. Phil. Pars Prima*, §§ lli. lxxv.

Notwithstanding these and various other similar coincidences, it has been asserted, with some confidence, that Descartes had never read the works of Bacon. "Quelques auteurs assurent que Descartes n'avoit point lu les ouvrages de Bacon; et il nous dit lui-même dans une de ses lettres, qu'il ne lut que fort tard les principaux ouvrage de Galilée." (*Eloge de Descartes*, par Thomas.) Of the veracity of Descartes, I have not the slightest doubt; and therefore I consider this last fact (however extraordinary) as completely established by his own testimony. But it would require more evidence than the assertions of those nameless writers alluded to by Thomas, to convince me that he had never looked into an author, so highly extolled as Bacon is, in the letters addressed to himself by his illustrious antagonist, Gassendi. At any rate, if this was actually the case, I cannot subscribe to the reflection subjoined to the foregoing quotation by his eloquent eulogist. "Si cela est, il faut convenir, que la gloire de Descartes en est bien plus grande."

NOTE M, p. 159.

From the indissoluble union between the notions of colour and of extension, Dr. Berkeley has drawn a curious, and, in my opinion, most illogical argument in favour of his scheme of idealism ;—which, as it may throw some additional light on the phenomena in question, I shall transcribe in his own words.

“ Perhaps, upon a strict inquiry, we shall not find, that even those who, from their birth, have grown up in a continued habit of seeing, are still irrevocably prejudiced on the other side, to wit, in thinking what they see to be at a distance from them. For, at this time, it seems agreed on all hands, that *colours*, which are the proper and immediate objects of sight, are not without the mind. But then, it will be said, by sight we have also the ideas of extension, and figure, and motion ; all which may well be thought *without*, and at some distance from the mind, though colour should not. In answer to this, I appeal to any man’s experience, whether the visible extension of any object doth not appear *as near* to him as the colour of that object ; nay, whether they do not both seem to be in the same place. Is not the extension we see coloured ; and is it possible for us, so much as in thought, to separate and abstract colour from extension ? Now, where the extension is, there surely is the figure, and there the motion too. I speak of those which are perceived by sight.”¹

Among the multitude of arguments advanced by Berkeley, in support of his favourite theory, I do not recollect any that strikes me more with the appearance of a wilful sophism than the foregoing. It is difficult to conceive how so very acute a reasoner should not have perceived that his premises, in this instance, lead to a conclusion directly opposite to what he has drawn from them. Supposing all mankind to have an irresistible conviction of the *outness* and distance of extension and figure, it is very easy to explain, from the association of ideas, and from our early habits of inattention to the phenomena of consciousness, how the sensations of colour should appear to the imagination to be transported *out* of the mind. But if, according to Berkeley’s doctrines, the constitution of human nature leads men to believe that extension and figure, and every other quality of the material universe, exists only within themselves, whence the ideas of *external* and of *internal* ; of *remote*, or of *near* ? When Berkeley says, “ I appeal to any man’s experience, whether the visible extension of any object doth not appear *as near* to him as the colour of that object ;” how much more reasonable would it have been to have stated the indisputable fact, that the colour of the object appears as *remote* as its ex-

¹ Essay toward a New Theory of Vision, p. 255.

tension and figure? Nothing, in my opinion, can afford a more conclusive proof, that the natural judgment of the mind is against the inference just quoted from Berkley, than the problem of D'Alembert, which has given occasion to this discussion.

NOTE N, p. 166.

It is observed by Dr. Reid, that "the system which is now generally received with regard to the mind and its operations, derives not only its spirit from Descartes, but its fundamental principles; and that, after all the improvements made by Malebranche, Locke, Berkeley, and Hume, it may still be called the *Cartesian system*." *Conclusion of the Inquiry into the Human Mind*.

The part of the Cartesian system here alluded to, is the hypothesis, that the communication between the mind and external objects is carried on by means of *ideas* or *images*;—not, indeed, transmitted *from without* (as the Aristotelians supposed) through the channel of the senses, but nevertheless bearing a relation to the qualities perceived, analogous to that of an impression on wax to the seal by which it was stamped. In this last assumption, Aristotle and Descartes agreed perfectly; and the chief difference between them was, that Descartes palliated, or rather kept out of view, the more obvious absurdities of the old theory, by rejecting the unintelligible supposition of *intentional species*, and by substituting, instead of the word *image*, the more indefinite and ambiguous word *idea*.

But there was another and very important step made by Descartes, in restricting the ideal Theory to the *primary* qualities of matter; its *secondary* qualities (of colour, sound, smell, taste, heat, and cold) having, according to him, no more *resemblance* to the sensations by means of which they are perceived, than arbitrary sounds have to the things they denote, or the edge of a sword to the pain it may occasion. (*Princ. Pars iv, §§ 197. 198.*) To this doctrine he frequently recurs in other parts of his works.

In these modifications of the Aristotelian Theory of Perception, Locke acquiesced entirely; explicitly asserting, that "the *ideas* of *primary* qualities are resemblances of them, but that the *ideas* of *secondary* qualities have no resemblance to them at all." *Essay*, B. ii, c. viii, § 15.

When pressed by Gassendi to explain how images of extension and figure can exist in an unextended mind, Descartes expresses himself thus: "Quaeris, quomodo existimem in me subiecto inextenso recipi posse speciem ideamve corporis quod extensum est? Respondeo, nullam speciem corpoream in mente

recipi, sed puram intellectionem tam rei corporeae quam incorporeae fieri absque ulla specie corporeae; ad imaginationem vero, quae non nisi de rebus corporeis esse potest, opus quidem esse specie quae sit verum corpus, et *ad quam mens se applicet*, sed non quae in mente recipiatur." Responsio de iis quae in sextam Meditationem objecta sunt, § 4.

In this reply it is manifestly assumed as an indisputable principle, that the immediate objects of our thoughts, when we *imagine* or *conceive* the primary qualities of extension and figure, are *ideas* or *species* of these qualities; and, of consequence, are themselves extended and figured. Had it only occurred to him to apply (*mutatis mutandis*) to the perception of *primary* qualities his own account of the perception of *secondary* qualities (that it is obtained, to wit, by the *media* of sensations more analogous to arbitrary signs, than to stamps or pictures,) he might have eluded the difficulty started by Gassendi, without being reduced to the disagreeable necessity of supposing his *ideas* or *images* to exist in the brain, and not in the mind. The language of Mr. Locke, it is observable, sometimes implies the one of these hypotheses, and sometimes the other.

It was plainly with the view of escaping from the dilemma proposed by Gassendi to Descartes, that Newton and Clarke were led to adopt a mode of speaking concerning perception, approaching very nearly to the language of Descartes. "Is not," says Newton, "the sensorium of animals the place where the sentient substance is *present*; and to which the sensible *species* of things are brought, through the nerves and brain, that there they may be perceived by the mind *present in that place*?" And still more confidently Dr. Clarke: "Without being *present to the images* of the things perceived, the soul could not possibly perceive them. A living substance can only there perceive where it is present. Nothing can any more act or be acted upon *where* it is not present, than it can *when* it is not." The distinction between primary and secondary qualities was afterwards rejected by Berkeley, in the course of his argument against the existence of matter; but he continued to retain the language of Descartes concerning *ideas*, and to consider them as the *immediate*, or rather as the *only* objects of our thoughts, wherever the external senses are concerned. Mr. Hume's notions and expressions on the subject are very nearly the same.

I thought it necessary to enter into these details, in order to shew with what limitations the remark quoted from Dr. Reid in the beginning of this note ought to be received. It is certainly true, that the Cartesian system may be said to form the groundwork of Locke's Theory of Perception, as well as of the skepti-

cal conclusions deduced from it by Berkeley and Hume; but it is not the less true, that it forms also the groundwork of all that has since been done towards the substitution, in place of this skepticism, of a more solid fabric of metaphysical science.

NOTE O, p. 167.

After the pains taken by Descartes to ascertain the *seat* of the soul, it is surprising to find one of the most learned English divines of the seventeenth century (Dr. Henry More) accusing him as an abettor of the dangerous heresy of *nullibism*. Of this heresy Dr. More represents Descartes as the chief author; and, at the same time, speaks of it as so completely extravagant, that he is at a loss whether to treat it as the serious opinion of a philosopher, or as the jest of a buffoon. "The chief author and leader of the Nullibists," he tells us, "seems to have been *that pleasant wit, Renatus Descartes*, who, by his *jocular* metaphysical meditations, has luxated and distorted the rational faculties of some otherwise sober and quick-witted persons." To those who are at all acquainted with the philosophy of Descartes, it is unnecessary to observe, that, so far from being a Nullibist, he valued himself not a little on having fixed the precise *ubi* of the soul, with a degree of accuracy unthought of by any of his predecessors. As he held, however, that the soul was *unextended*, and as More happened to conceive that nothing which was unextended could have any reference to place, he seems to have thought himself entitled to impute to Descartes, in direct opposition to his own words, the latter of these opinions as well as the former. "The true notion of a spirit," according to More, "is that of an extended penetrable substance, logically and intellectually divisible, but not physically discernible into parts."

Whoever has the curiosity to look into the works of this once admired, and, in truth, very able logician, will easily discover, that his alarm at the philosophy of Descartes was really occasioned, not by the scheme of *nullibism*, but by the Cartesian doctrine of the *non-extension* of mind, which More thought inconsistent with a fundamental article in his own creed—the existence of witches and apparitions. To hint at any doubt about either, or even to hold any opinion that seemed to weaken their credibility, appeared to this excellent person quite a sufficient proof of complete atheism.

The observations of More on "the true notion of a spirit" (extracted from his *Enchiridion Ethicum*) were afterwards republished in Glanville's book upon witchcraft;—a work (as I before mentioned) proceeding from the same pen with the *Scepsis Scien-*

tifica, one of the most acute and original productions of which English philosophy had then to boast.

If some of the foregoing particulars should, at first sight, appear unworthy of attention in a historical sketch of the progress of science, I must beg leave to remind my readers, that they belong to a history of still higher importance and dignity—that of the progress of Reason, and of the Human Mind.

NOTE P, p. 170.

For an interesting sketch of the chief events in the life of Descartes, see the Notes annexed to his Eloge by Thomas; where also is to be found a very pleasing and lively portrait of his moral qualities. As for the distinguishing merits of the Cartesian philosophy, and more particularly of the Cartesian metaphysics, it was a subject peculiarly ill adapted to the pen of this amiable and eloquent, but verbose and declamatory academician.

I am doubtful, too, if Thomas has not gone too far, in the following passage, on a subject of which he was much more competent to judge than of some others which he has ventured to discuss: “L’imagination brillante de Descartes se décèle partout dans ses ouvrages; et s’il n’avoit voulu être ni géomètre ni philosophe, il n’auroit tenu qu’à lui d’être le plus bel esprit de son temps.” Whatever opinion may be formed on this last assertion, it will not be disputed by those who have studied Descartes, that his *philosophical* style is remarkably dry, concise, and severe. Its great merit lies in its singular precision and perspicuity;—a perspicuity, however, which does not dispense with a moment’s relaxation in the reader’s attention; the author seldom repeating his remarks, and hardly ever attempting to illustrate or to enforce them either by reasoning or by examples. In all these respects, his style forms a complete contrast to that of Bacon’s.

In Descartes’ *epistolary* compositions, indeed, ample evidences are to be found of his vivacity and fancy, as well as of his classical taste. One of the most remarkable is a letter addressed to Balzac, in which he gives his reasons for preferring Holland to all other countries, not only as a tranquil, but as an agreeable residence for a philosopher; and enters into some very engaging details concerning his own petty habits. The praise bestowed on this letter by Thomas is by no means extravagant, when he compares it to the best of Balzac’s. “Je ne sçais s’il y a rien dans tout Balzac où il y ait autant d’esprit et d’agrément.”

NOTE, p. 177.¹

It is an error common to by far the greater number of modern metaphysicians, to suppose that there is no medium between the innate ideas of Descartes, and the opposite theory of Gassendi. In a very ingenious and learned essay on Philosophical Prejudices, by M. Trembley,² I find the following sentence: “Mais l'expérience dément ce système des idées innées puisque la privation d'un sens emporte avec elle la privation des idées attachées à ce sens, comme l'a remarqué l'illustre auteur de *l'Essai Analytique sur les Facultés de l'Âme*.”

What are we to understand by the remark here ascribed to Mr. Bonnet? Does it mean nothing more than this, that to a person born blind, no instruction can convey an idea of colours, nor to a person born deaf, of sounds? A remark of this sort surely did not need to be sanctioned by the united names of Bonnet and of Trembley: Nor, indeed, does it bear in the slightest degree on the point in dispute. The question is not about our ideas of the *material* world, but about those ideas on *metaphysical* and *moral* subjects, which may be equally imparted to the blind and to the deaf; enabling them to arrive at the knowledge of the same truths, and exciting in their minds the same moral emotions. The *signs* employed in the reasonings of these two classes of persons will of course excite by association, in their respective fancies, very different *material images*; but whence the origin of the physical and moral *notions* of which these signs are the vehicle, and for suggesting which, *all* sets of signs seem to be equally fitted? The astonishing scientific attainments of many persons, blind from their birth, and the progress lately made in the instruction of the deaf, furnish palpable and incontestible proofs of the flimsiness of this article of the Epicurean philosophy;—so completely verified is now the original and profound conclusion long ago formed by Dalgarno, “That the soul can exert her powers by the ministry of any of the senses: and, therefore, when she is deprived of her principal secretaries, the eye and the ear, then she must be contented with the service of her lackeys and scullions, the other senses; which are no less true and faithful to their mistress than the eye and the ear; but not so quick for despatch.” *Didascalocophus*, &c. Oxford, 1680.

I was once in hopes of being able to throw a still stronger light on the subject of this note, by attempting to ascertain ex-

¹ The reference to this Note was accidentally omitted in the proper place. It ought to have been in page 177, line 3, at the end of the first paragraph.

² *Essai sur les Préjugés*, &c. Neuchatel, 1790.

perimentally the possibility of awakening and cultivating the dormant powers of a boy destitute of the organs both of sight and of hearing; but unexpected occurrences have disappointed my expectations.

I have just learned, that a case somewhat similar, though not quite so favourable in all its circumstances, has recently occurred in the state of Connecticut in New England; and I have the satisfaction to add, there is some probability that so rare an opportunity for philosophical observations and experiments will not be overlooked in that quarter of the world.

NOTE Q, p. 179.

Of Gassendi's orthodoxy as a Roman Catholick divine, he has left a very curious memorial, in an inaugural discourse pronounced in 1645, before Cardinal Richelieu, when he entered on the duties of his office as Regius Professor of Mathematicks at Paris. The great object of the oration is to apologize to his auditors for his having abandoned his ecclesiastical functions, to teach and cultivate the profane science of geometry. With this view, he proposes to explain and illustrate the saying of Plato, who, being questioned about the employment of the Supreme Being, answered, *Γεωμετρεῖν τὸν θεόν*. In the prosecution of this argument, he expresses himself thus on the doctrine of the Trinity.

“Anne proinde hoc adorandum Trinitatis mysterium habebimus rursus ut sphaeram, cujus quasi centrum sit Pater Aeternus, qui totius divinitatis fons, origo, principium accommodatè dicitur; circumferentia Filius, in quo legitur habitare plenitudo Divinitatis; et radii centro circumferentiaque intercedentes Spiritus Sanctus, qui est Patris et Filii nexus, vinculumque mutuum? Anne potius dicendum est eminere in hoc mysterio quicquid sublime magnificumque humana geometria etiamnum requirit? Percelebre est latere eam adhuc, quam quadraturam circuli vocant; atque idcirco in eo esse, ut describat triangulum, cujus si basin ostenderit circuli ambitui aequalem, tum demum esse circulo triangulum aequale demonstrat. At in hoc mysterio augustissimo gloriosissima Personarum Trias ita infinitae essentiae, ipsiusque foecunditati, tanquam circulo exaequatur, seu, ut sic loquar, et veriùs quidem, penitùs identificatur; ut cum sit omnium, et cujusque una, atque eadem essentia, una proinde ac eadem sit immensitas, aeternitas, et perfectionum plenitudo.

“Sic, cum nondum nôrit humana geometria trisecare angulum, dividereve, et, citra accommodationem mechanicam, ostendere divisum esse in tria aequalia; habemus in hocce mysterio

unam essentiam non tam trisectam, quàm integram communicatam in tria aequalia supposita, quae cum simul, sigillatimque totam individuamque possideant, sint inter se tamen realiter distincta."

The rest of the oration is composed in exactly the same taste.

The following interesting particulars of Gassendi's death are recorded by Sorbière.

"Extremam tamen horam imminentem sentiens, quod reliquum erat virium impendendum existimavit praeparando mortem animo. Itaque significavit, ut quamprimum vocari Sacerdos, in cujus aurem, dum fari poterat, peccata sua effunderet. . . . Dein, ut nihil perfectae Christiani militis armorum deesset, sacro inungi oleo efflagitavit. Ad quam caeremoniam animo attendens, cum sacerdos aures inungens pronuntiaret verba solennia, et lapsu quodam memoriae dixisset, *Indulgeat tibi Dominus quidquid per odoratum peccasti*, reposuit statim aeger, imo *per auditum*; adeo intentus erat rei gravissimae, et eluendarum sordium vel minimarum cupidum se et sitibundum gerebat." Sorberii Praefatio.

Having mentioned in the text the avowed partiality of Gassendi for the Epicurean ethicks, it is but justice to his memory to add, that his own habits were, in every respect, the reverse of those commonly imputed to this school. "Ad privatam Gassendi vitam saepius attendens," says Sorbière, "anachoretam aliquem cernere mihi videor, qui mediâ in urbe vitam instituit planè ad monachi severioris normam; adeo paupertatem, castitatem et obedientiam coluit; quanquam sine ullo voto tria ista vota solvisse videatur.—Abstemius erat sponte sua, ptisanam tepidam bibens pulmone refrigerando humectandoque. Carne raro, herbis saepius, ac maceratâ offâ manè et vesperè et utebatur." Ibid.

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1. Nov. 183

DISSERTATION THIRD :

EXHIBITING A GENERAL VIEW OF THE

Progress of Chemical Philosophy,

FROM THE EARLY AGES TO THE END OF THE
EIGHTEENTH CENTURY.

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DISSERTATION THIRD.

SECTION I.

GENERAL VIEW OF THE PROGRESS OF CHEMICAL SCIENCE, FROM THE EARLY AGES TO THE END OF THE SEVENTEENTH CENTURY.

THE phenomena of the universe present a series of changes, of which the regularity and harmonious succession excite the surprise of superficial observers, and awaken the admiration and attention of the philosophick mind.

These changes are either accompanied by visible motion susceptible of measurement, and relate to the exterior forms and mechanical characters of bodies, or they depend upon the mutual agencies of the elementary principles of matter, upon its composition, upon its susceptibility of acquiring new properties by entering into new combinations.

The investigation of the former phenomena belongs to the mechanical philosopher ; to trace the causes of the latter, and to discover the laws to which they are obedient, is the business of Chemical Science.¹

¹ *Definitions of Chemistry.*—“ La Chymie est un art qui enseigne à separer les differentes substances qui se rencontrent dans un mixte.” (L’Emery, *Cours de Chymie.*)

Chemistry, considered as a branch of scientific inquiry, is not of ancient date.¹ Founded upon principles deduced

“Chemistry is that science which examines the constituent parts of bodies, with reference to their nature, proportions, and method of combination.” (Bergman, *Essay on the Usefulness of Chemistry*.)

“Chemistry is the study of the effects of heat and mixture, with a view of discovering their general and subordinate laws, and of improving the useful arts.” (Black, *Lectures*.)

“La Chimie est une science qui apprend à connaître l'action intime et réciproque de tous les corps de la nature, les uns sur les autres. Par les mots *action intime*, et *reciproque*, cette science est distinguée de la physique expérimentale, qui ne considère que les propriétés extérieures des corps doués d'un volume, et d'une masse qu'on peut mesurer, tandis que la Chimie ne s'attache qu'aux propriétés intérieures, et n'agit que sur des molécules, dont le volume et la masse ne peuvent pas être soumis aux mesures et aux calculs.” (Fourcroy, *Système des Connoissances Chimiques*, Vol. I. p. 4.)

“Die Chemie ist eine Wissenschaft die uns die wechselseitige wirkungen der einfachern Stoffe in der Natur, die zusammensetzung der körper aus ihren und nach ihrdn verschiedenen verhältnissen, und die Art und Weise kennen lehrt, sie zu trennen, oder sie wieder zu neuen Körperarten zu verbinden.” (Gren. *Systematisches handbuch der Chemie*, p. 1. Halle, 1794.)

“Chemistry is that science which treats of those events or changes in natural bodies, which are not accompanied by sensible motions.” Thomson, *System of Chemistry*, fifth edition, p. 2.)

Most of the substances belonging to our globe are constantly undergoing alterations in sensible qualities, and one variety of matter becomes, as it were, transmuted into another. Such changes, whether natural or artificial, whether slowly or rapidly performed, are called chemical;—thus the gradual and almost imperceptible decay of the leaves and branches of a fallen tree exposed to the atmosphere, and the rapid combustion of wood in our fires, are both chemical operations.

“The object of chemical philosophy is to ascertain the causes of all phenomena of this kind, and to discover the laws by which they are governed.” (Davy, *Elements of Chemical Philosophy*, p. 1.)

In the edition of Johnson's *Dictionary*, now publishing by the Rev. H. J. Todd, the erroneous and antiquated definition of Boerhaave is very improperly retained. “An art whereby

from experiment and observation, centuries were consumed in their accumulation and systematic arrangement ; but, as

sensible bodies contained in vessels, or capable of being contained therein, are so changed by means of certain instruments, and principally fire, that their several powers and virtues are thereby discovered, with a view to philosophy or medicine."

The derivation of the word Chemistry can scarcely be said to have been ascertained. The most plausible guesses are the following : from *χυν* to melt, or *χυμος* juice ; from *kema*, an oriental word signifying *black* ; from *χημης*, the name of a person eminently skilled in the sciences ; from *Chêmi*, the Coptick name of Egypt, where the art is supposed to have had its rise.

According to Bryant (*Ancient Mythol.*), it is derived from *chemia*, and that word from *Cham*.

The Rev. Mr. Palmer, Professor of Arabick at Cambridge, has given the following etymology : " Al-chemy, or more properly Al-kemy, the knowledge of the substance or composition of bodies, so named from the substantive (Kyamon,) that is, the substance or constitution of any thing ; from the root (Kama.) Golius. *Lexicon*." (Thomson's *Chemistry*, 5th edit. p. 4. Note.)

Conversing upon this subject with Dr. Thomas Young, he remarked, that the Egyptians probably neither knew nor cared much about the *composition* of bodies ; and the term of Chemistry, as referring to the secret art of transmutation, was probably derived from the Coptick root *hkems* or *chems*, signifying *obscure*, *dark*. The German word *gheim*, *secret*, he said, was perhaps of the same root.

" Haec ars varia accepit nomina, nam omnium primò dicta fuit *τεχνη ποιητική*, et antiquis illis temporibus per hanc significabant artem vitia metalla in aurum convertendi, et ejus artifices *ποιηταί* vocari Zozimus dicit. Veteres Aegyptios hanc artem *Chimot* vocasse Josephus Scaliger ibi ostendit, sed postea Graeci hanc artem *χρυσοποιαν* dixerunt, Arabibus vero, *Alchemia*." (Boerhaave, (*Institutiones Chemiae*.)

¹ " Tout ce qu'on a dit de l'antique origine de la Chimie, sur les premiers hommes qui ont travaillé les métaux, taillé et poli les pierres dures, fondu les sables, dissous et cristallisé les sels, ne montre à un esprit exact et sévère qu'une vaine et ridicule pretension, semblable à cette par laquelle on voudrait reconnoître les élémens de la géométrie dans l'ouvrage grossier du sauvage qui use les fragmens du rocher, qui leur donne des formes à peu près régulières pour les rendre utiles à ses premiers besoins." (Fourcroy, *Discours Préliminaire*.)

an art, chemistry is readily traced to periods of remote antiquity ; for it is obvious that the chemical changes of matter must have been rendered subservient to the wants of mankind in the earliest ages of the world.

Metallurgy is among the most ancient of the arts, and Tubal Cain, the instructor of workers in iron and brass, has thence been called the inventor of chemistry. Others have preferred the claims of Noah, to whom the invention of wine has been attributed ; but these, and other arts alluded to in Sacred Writ, such as dyeing, gilding, and embalming, which have been adduced as instances of chemical knowledge in the time of Moses, prove nothing more than that such processes were practised at that period, independent of each other, and quite unconnected by the slightest reference to general principles.¹

It is probable that the early mythological systems of the Egyptians contained some allusions to the chemical changes of matter, and to them the first speculations on the art of transmutation have been attributed. Hermes, or Mercurius Trismegistus, the favourite minister of the Egyptian king Osiris, has been celebrated as the inventor of this art, and the first treatise upon it has been attributed to Zosymus, of Chemnis or Panopolis in Egypt. The inhabitants of Sidon and Tyre, those renowned seats of the commerce of the ancient world, seem to have been skilled in some

¹ “ Si l'on examine cependant avec courage et sans préjugé toutes les preuves qu'on a réunies pour établir l'existence de la Chimie chez les Egyptiens, après avoir reporté son origine aux premiers âges du monde, et aux premiers travaux ou les hommes ont employé le feu comme agent, on reconnaît bientôt que tirées uniquement des produits employés dans leurs constructions diverses, elles peuvent toutes annoncer des arts ou des procédés de fabrique plus ou moins avancés mais rien qui tienne à des notions générales tirées de ces arts comparés, rien qui dépende d'une doctrine suivie, rien enfin qui puisse donner une idée d'une véritable science.” (Fourcroy, *Disc. Prél.*)

chemical manufactures ; they made glass and artificial gems, and excelled in dyeing purple.

Egypt maintained its superiority in arts until the invasion of Alexandria by the Saracens, when the celebrated library collected by the Ptolemies, with great diligence and at enormous expense. was burned by the orders of the Caliph Omar.¹ The alchemical works had been previously destroyed by Diocletian in the fourth century, lest the Egyptians should acquire by such means sufficient wealth to withstand the Roman power. On the present occasion, about seven hundred thousand volumes were seized, which we are told supplied six months fuel for forty thousand baths, that contributed to the health and convenience of the populous capital of Egypt.

When philosophy declined in Egypt and in the East, Greece became the principal seat of learning and of the arts ; but the system of their early philosophers, of Thales² the founder of the Ionick sect, of Anaximander, and Anaximenes, breathe the sentiments of the Egyptian schools. By Thales, water was considered as the source of all things, as the universal element. The opinions of Anaximander, in themselves unintelligibly obscure, received some elucidation from his successor Anaximenes ; they regarded air and fire as the first rudiments of matter.

The result of the Macedonian war introduced Grecian philosophy into Italy, and the doctrines of Plato,³ and Aristotle, and Theophrastus, prevailed in the school of Rome.

Among the early Roman philosophers, Lucretius⁴ stands preeminent ; but his opinions had been formed at Athens,

¹ “ Qui his scriptis parcendum esse negabat, quippe quae inutilia essent, si eorum dogmata Alcorano congruerent, noxia vero, si ab illo dissentirent.” (Bergman, *De primordiis Chemiae.*)

² 500 years B. C.

³ 340 years B. C.

⁴ 50 years B. C.

in the Stoick school of Zeno, and he early imbibed the doctrines of Empedocles and Epicurus, which are expounded with superiour genius and admirable ingenuity in his masterly poem on the *Nature of Things*.

The celebrated Natural History of the elder Pliny, written in the first century of the Christian era, contains an account of the rise and progress of the arts and sciences previous to that period, which, though not always accurate, often obscure, and sometimes unintelligible, abounds in instructive documents and interesting remarks. It is written, not in the elevated, refined, and elegant style of the Augustan age, but in the language of the laborious and liberal historian, frequently led by the extent of his inquiries to subjects which he is incompetent to manage, and upon which his opinions are incorrect, his conjectures vague, his assertions ill founded.

The origin of many of the follies and mysteries of Alchemy may perhaps be referred with most propriety to the *New Platonists*, whose rise marked the declining age of learning towards the end of the third century of the Christian era. These philosophists, celebrated for their metaphysical disputes and superstitious notions, credited the existence of demons and spirits, with whom they claimed familiar intercourse. Neglecting useful knowledge, they exhausted their strength in verbal disputes, and in attempts to discover the secrets of the invisible world; thus gradually converting the study of philosophy into that of demonology and magick. "Several of these masters," says Gibbon, "Ammonius, Plotinus, Amelius, and Porphyry, were men of profound thought and intense application: but, by mistaking the true object of philosophy, their labours contributed much less to improve than to corrupt the human understanding."

Porphyry died about the time of Diocletian's abdication. The life of his master, Plotinus, which he composed, gives a complete idea of the genius of the sect, and the manners of the Professors. This curious piece is inserted in Fabricius. (*Bibliotheca Graeca*, Tom. IV.) When the cultivated part of Europe was overwhelmed by the barbarous nations, all records of arts and sciences possessed by the Greeks, and by their Roman successors, were swept away in the general destruction, and now the Arabians became the protectors of philosophy, and the promoters of its pursuits. To them, Chemistry, regarded as a distinct branch of experimental philosophy, owes its origin, and several circumstances co-operated to render its progress rapid, which are important in their relation to the subsequent advances of the science. Among these the mysteries of Alchemy, so well adapted to the genius of that age and people, are the most remarkable. Of this occult art, the two leading objects were the *transmutation* of common metals into gold and silver, and the discovery of the *universal medicine*, which, by the removal and prevention of disease, should confer immortality upon the possessors of the secret.

The origin of these chimerical notions has been variously accounted for. The idea of transmutation may plausibly be referred to the various processes to which natural bodies were submitted by the astrological experimentalists of the seventh and eighth centuries. Observing the change of properties in metallick ores by exposure to heat, and the production of malleable and useful metals from their brittle and useless compounds, it is not surprising that superficial observation and incorrect reasoning should lead to a belief in their production and transmutation; and such speculations, not without apparent foundation, holding out attraction to the ambitious, and hope to the needy, would soon excite

notice, and command followers. That this was the case, the records of those times amply testify.

The pursuit of the other object may be referred to the success attending the medical employment of many of the chemical preparations. Pharmacy was becoming enriched by the introduction of chemical compounds ; and remedies for diseases, before deemed incurable, were occasionally discovered among the products of the furnace. Hence, perhaps, the possibility of the existence of an universal remedy might occur to those under the infatuations of the black art.

The earliest of the true Alchemists, whose name has reached posterity, is Geber,¹ supposed to have been an Arabian prince of the seventh century. The works attributed to Geber, several of which have been published in Latin translations by Golius, and others in English by Russell, are numerous and curious. They abound in the cant and jargon of the hidden art. Some have asserted his pretensions to the possession of the universal medicine, for he speaks of curing disease. But this seems a mere metaphorical expression, relating to transmutation. "Bring me," says he "the six lepers, that I may cleanse them;" by which he doubtless would imply the conversion of silver, mercury, copper, iron, tin, and lead, into gold,—there be-

¹ "Primus omnium Arabum post Graecos est *Geber*, cui dant titulum Arabis. Alii dicunt eum fuisse regem, unde *rex Geber Arabs*, dici solet; sed *Leo Africanus*, qui Graecus fuit et multa descripsit ex antiquis Arabibus, dicit, Gebrum illum natione Graecus fuisse, sed derogasse suam religionem, et se dedisse Mahomedaee religioni Arabum, et vixisse septimo seculo." (Boerhaave.)

Geber was also a physician and astronomer. The following are the principal works on Chemistry, which have been attributed to him: *De Alchemia*,—*De summâ perfectione Metallorum*,—*De Lapide Philosophico*,—*De inveniendi arte Auri et Argenti*. These, and some other works bearing his name, whether genuine or not, furnish good specimens of the early alchemical writings.

ing only these seven metals known at that period. Dr. Johnson supposes that the word *Gibberish*, anciently written *Geberish*, was originally applied to the language of Geber and his tribe.

The elder Mesue and Avicenna,¹ physicians of the ninth and tenth centuries, have given some account of the Chemistry of their age, but their works relate chiefly to medicine. Indeed, it is probable, that the writings now extant in the name of the former are spurious.

The twelfth, thirteenth, and fourteenth centuries, abound in writers on the secrets of Alchemy ; and the happy few to whom fate and metaphysical aid had granted the discovery of the great secret, assumed the title of *adepts*, a character which required to be sustained by superiour feats of deception and duplicity.

About this period, several circumstances happily concurred, favourable to the diffusion of learning and the arts, which began again to dawn in Europe with promising splendour.

The extravagant expeditions of the Crusaders tended, in these respects, to the most extensive, beneficial, and permanent consequences. In their progress to Palestine, these ardent followers of the Cross traversed countries which, compared with their own, were cultivated, civilized, and refined. Their minds and manners were thus enlarged and improved, and new customs and institutions attracted their notice.

In Constantinople, then the largest and most magnificent of European cities, some traces of ancient elegance and refinement were still to be found, and many of the natural

¹ Avicenna introduced several important drugs into the *Materia Medica* ; and the art of making sugar has been enumerated among his discoveries, although, doubtless of earlier date.

products and of the manufactures of the East were offered to their notice.¹

We accordingly discover in these superstitious and enthusiastick expeditions the source of many improvements, which afterwards raised Europe to the highest rank among nations; which tended to dispel barbarism, to mitigate the fury of war, and to extend commerce; and which ultimately led to the cultivation of the useful and fine arts, and to the diffusion and exaltation of science.

Another event occurred about this period, which miraculously facilitated the acquisition and propagation of learning, namely, the invention of printing, which, as it were by superhuman mediation, advanced so rapidly to perfection, that the finest specimens of typography are to be found among the early efforts of the art. It was introduced into England by the Earl of Rivers, in the reign of Edward IV.²

Of the earlier writers on Chemistry, no one is more deserving notice than the celebrated Roger Bacon, a native of Somersetshire, who flourished in the thirteenth century. His writings, though troubled and polluted by the reigning absurdities of Alchemy, contain many curious facts and judicious observations. To him the discovery of gun-

¹ "The first and most obvious progress was in trade and manufactures,—in the arts, which are strongly prompted by the thirst of wealth, the calls of necessity, and the gratification of the senses or vanity. Among the crowd of unthinking fanaticks, a captive or a pilgrim might sometimes observe the superiour refinement of Cairo and Constantinople. The first importer of windmills was the benefactor of nations; and if such blessings are enjoyed without any grateful remembrance, history has condescended to notice the more apparent luxuries of silk and sugar, which were transported into Italy from Greece and Egypt." (Gibbon, *General consequences of the Crusades*, Vol. XI. p. 289. Edit. 1813.)

² Hume. Edward V.

powder has, with all appearance of justice, been attributed.¹ “From saltpetre and other ingredients,” he says, “we are able to form a fire which will burn to any distance.” And again, alluding to its effects, “a small portion of matter, about the size of the thumb, *properly disposed*, will make a tremendous sound and coruscation, by which cities and armies might be destroyed.” And again, in the same work, is a passage which, though somewhat enigmatical, is supposed to divulge the secret of this preparation. “Sed tamen salis petrae, *luru mone cap urbre*, et sulphuris, et sic facies tonitrum si scias artificium.” The anagram is convertible into *carbonum pulvere*. Such are the claims of Roger Bacon to a discovery which soon changed the whole art of war.

The works of Bacon most deserving perusal are the *Opus Majus*, edited by Dr. Jebb in 1733; and his *Epistola de secretis Operibus Artis et Naturae, et de nullitate Magiae*. Paris, 1532. The former, addressed to Pope Clement IV., breathes sentiments which would do honour to the most refined periods of science, and in which many of the advantages likely to be derived from that mode of investigation insisted upon by his great successor Chancellor Bacon, are anticipated.

Raymond Lully, Arnold of Villanova,² John de Rupe-scissa, and Isaac and John of Holland,³ were Alchemists

¹ Watson's *Chemical Essays*, Vol. I.

It has been by some imagined, that Roger Bacon invented the air-pump; but the idea rests upon very doubtful expressions. (Boerhaave, *Instit. Prolegom.*)

² Raymond Lully was born in Majorca in 1236, and Villanova in Provence 1235. Their writings are as obscure as they are voluminous.

³ “Sequuntur nunc Johannes et Isaacus Hollandus, pater et filius, qui diffusissimo sermone et magna eloquentiâ scripserunt, et si unum vel alterum arcanum exceperis, pulcherrima experi-

of the thirteenth, fourteenth, and early part of the fifteenth century. Their writings are extremely numerous; and they each treat of the philosopher's stone, and other secrets of the occult science.

Basil Valentine of Erfurt, who wrote towards the end of the fifteenth century, is deserving of more attention, and ranks among the first who introduced metallick preparations into medicine. In his *Currus Triumphalis Antimonii*,¹ after setting forth the chemical preparations of that metal, he enumerates their medicinal effects. According to the notions of the age, he boasts of supernatural assistance; and his work furnishes a good specimen of the controversial disputes between the chemical physicians and those of the school of Galen,---the former being attached to active remedies, the latter to more simple and inert medicines. The *Chariot of Antimony* opens with the most pious exhortations to prayer and contemplation, to charity and benevolence. But the author, soon forgetting himself, breaks out in the following strain of virulent invective. "Ye wretched and pitiful medicasters, who, full of deceit, breathe out I know not what Thrasonick brags;---infamous men, more mad than Bacchanalian fools! who will neither learn, nor dirty your hands with coals! you titular doctors,

menta fecerunt de sanguine et urinâ humanâ, quae Helmontius postea et Boyleus pro recentioribus inventis habuerunt." (Boerhaave.)

¹ It is probable that the word Antimony was first used by Basil Valentine. Tradition relates, that having thrown some of it to the hogs, after it had purged them heartily, they immediately fattened; and, therefore, he imagined, that his fellow monks would be the better for a like dose, they having become lean by fasting and mortification. The experiment, however, failed, and they died; whence the medicine was called *Antimoine*.

He published several other works besides the *Currus Triumphalis Antimonii*. See Chalmer's *Biograph. Dict.*

who write long scrolls of receipts ; you apothecaries, who with your decoctions fill pots no less than those in princes' courts, in which meat is boiled for the sustenance of some hundreds of men ; you, I say, who have hitherto been blind, suffer a collyrium to be poured into your eyes, and permit me to anoint them with balsam, that this ignorance may fall from your sight, and that you may behold truth as in a clear glass. But," says Basil Valentine, after a long exhortation in this strain, "I will put an end to my discourse, lest my tears, which I can scarcely prevent continually falling from my eyes, should blot my writing, and, whilst I deplore the blindness of the world, blemish the lamentation which I would publish to all men."

Such is the trash in which these authors abound, and in which curious facts and ingenious speculations are often enveloped.

Basil Valentine was succeeded by the more celebrated Paracelsus, a native of a village near Zurich in Switzerland.¹ In this remarkable person, all the follies and extravagance of the Alchemists were united ;---he pretended to the discovery of the grand secret of the universal remedy ; and his writings, which are very numerous, overflow with the whims and oddities of the sect ; his zeal was more directed to the acquisition of popularity than to the advancement of science ; his enthusiasm was ever misemployed ; and he sought the elevation of his own character

¹ He assumed the formidable title of Philippus Aureolus Theophrastus Bombastus Paracelsus ab Hohenheim.

"Hunc virum," says Boerhaave, "alii coluerunt pro Deo, imo locutus sum cum hominibus qui credunt eum non esse mortuum, sed vivum sedere in sepulchro pertaesum peccatorum et malorum hominum." The following is an illustrative anecdote of his impudence : "Cum adscenderet Cathedram physico-medecam, sumsit vas aeneum cum igne, immisit sulphur et nitrum, et simul Galenum, Avicennam, et Arabes conjecit in ignem, dicens, sic vos ardebitis in gehennâ."

in the abuse and depreciation of his predecessors and contemporaries. He terminated a life, stained with every vice, and deficient in every virtue, in the year 1541, at an obscure inn at Saltzbourg, in Bavaria.

In the history of medicine, Paracelsus deserves more honourable mention; for he enriched the *Materia Medica* with many powerful remedies, derived from the mineral world, among which several preparations of mercury deserve especial notice; nor was he unacquainted with the virtues of opium, and other powerful drugs of vegetable origin. These he administered with a daring but often successful hand, and gained such celebrity, that, in 1527, he was promoted by the magistracy of Basle to the office of Professor of Physick. In this he expounded his own doctrines, asserting that that which was denied him from above had been granted by the infernal deities; and that to them he was indebted for those great secrets of physick and philosophy which he should divulge for the advantage and salvation of his hearers. Paracelsus, however, soon became weary of his situation, and terminated his professorial career, which was ill suited to his genius and inclinations, in the year 1528; he left Basle, and his subsequent life was one disgusting scene of dissolute irregularity.

The last person whose name deserves to remain upon the chemical records of the sixteenth century is Van Helmont of Brussels, born in 1577,¹ who, at an early age, made considerable progress in philosophical studies. As a physician, he adopted the doctrines of the chemical school, and rejected those of Aristotle and Galen; he effected cures so numerous and surprising, that he was accused by

¹ The year 1558, given in Moreri, *Dictionnaire Hist.* is obviously incorrect, "Anno 1594, qui erat mihi decimus septimus," &c. (Van Helmont, *opera omnia*, 1707. *Studia Authoris.*)

the inquisition of employing supernatural means, which induced him to retire into Holland. The writings of Van Helmont are chiefly upon medical subjects; those connected with chemistry contain some curious speculations respecting aeriform fluids, which he calls *gases*, a term now in common use. He also speaks of a subtile invisible agent, called *Blas*, which, he says, is an ethereal emanation from the heavenly bodies. "Winds are air agitated by the *Blas* of the stars."¹

The doctrine of the Four Elements, as established by the ancient philosophers, underwent several alterations in the hands of the chemists of the sixteenth century. The former regarded Earth, Water, Air, and Fire, as the universal rudiments of all matter, and assigned to each its particular station in the universe. Earth tended towards the centre, water to the surface of the globe; air occupied a middle station between water and fire; which last was considered as the most rare, subtile, and active of all things; it was supposed to constitute the heavenly bodies, and to confer life and action upon the other principles, to various combinations of which the different productions of nature were referred.

Basil Valentine, Paracelsus, and Van Helmont, speak of Salt, Sulphur, and Mercury, as the elementary principles of bodies; but the passages in their works referring to this hypothesis, are too dark and absurd to merit quotation; it was, however, adopted by several of their contemporaries and successors.

¹ "Nescivit inquam schola Galenica hactenus differentiam inter gas ventosum, quod mere aer est, id est, ventus per siderum blas commotus, gas pingue, gas siccum, quod sublimatum dicitur, gas fuliginosum sive endemicum, et gas silvestre sive incoercibile, quod in corpus non cogi potest visibile." (*Oper. om.* p. 399.)

During the sixteenth century, some progress was made in the elucidation of the chemical arts, especially of Metallurgy, upon which subject the works of Agricola,¹ and of Lazarus Erckern, merit particular notice. The former has detailed, at considerable length, the various operations employed in mining, and his descriptions are at once correct and elegant; but his attempts at theory are deeply tinged with the prevailing follies of the age. Agricola, who died at Chemnitz in 1555, was succeeded by Erckern, superintendant-general of the German mines; “he is an experienced, candid, and honest writer, relates nothing but what he had himself seen, without a word of theory or reasoning, and every where speaks as if he were sitting before the furnace and relating what passed.”²

After wading through the thick fog of alchemical speculation, which envelopes the writers of this period, it is a relief to meet with one whose details are thus intelligible, and who adheres to matter of fact.

The periods we have now considered, teemed with searchers for the philosophers stone,—the elixir of life,—and the universal medicine. Of these such have hitherto only been noticed, as conduced, by their experiments and discoveries, to the progress of chemical science.

¹ The mineralogical works of Agricola display very minute information upon the most important parts of his subject. They are, 1. *De ortu et causis subterraneorum*. 2. *De natura eorum quae effluunt ex terrâ*. 3. *De natura Fossilium*. 5. *De medicatis fontibus*. 6. *De subterraneis animantibus*. 7. *De veteribus et novis metallis*. 8. *De re metallica*. This last has passed through several editions, and is an excellent compendium of what was then known upon the theory and practice of the miners art, and of the working of metals.

² “Liber ejus (Lazer. Erckern), in folio, est editus linguâ Teutonicâ, pollicem crassus et iterum recusatus est in Germana, in 4to. Est auctor in hac parte optimus.” (Boerhaave.)

The records of the fifteenth and sixteenth centuries present a motley group of these adventurers solely devoted to the occult art of transmutation. Some were open impostors ; others deluded believers ; but their respective histories are, in general, so similar, that an account of one will suffice :¹ Bernard Trevisan, who was born at Paris early in the fifteenth century, and who suffered severely under this intellectual epidemick, may be cited for the purpose. He commenced his career with the unsuccessful repetition of certain processes of transmutation described by Rhazes, in which he expended eight hundred crowns. The perusal of Geber's treatise on the perfection of the metals rekindled his hopes, and, after wasting two thousand crowns upon apparatus and materials, this experiment proved as fruitless as the former. The writings of Ruspescissa, Archelaus, and Sacrobosca, shortly afterwards engaged his notice ; and, to ensure success, he associated himself with a monk, and performed a variety of silly but laborious experiments, at the expense of more than a thousand crowns. He submitted the same portion of spirit of wine to three hundred

¹ Among the English alchemists, we may enumerate George Ripley, who, in 1471, wrote the *Compound of Alchemie*, dedicated to Edward IV. ; and the celebrated Elias Ashmole, who called himself *Mercuriophilus Anglicus*, and who published and edited many treatises on alchemy. He founded the Ashmolean Museum at Oxford in 1679. The reader, who may wish to amuse himself with the nonsense of our own alchemists, is referred to the *Theatrum Chemicum Britannicum, containing severall poeticall pieces of our famous English philosophers who have written the Hermetique mysteries in their owne antient language. By Elias Ashmole, Esq. Qui est Mercuriophilus Anglicus ;* and to the celebrated alchemical work *Philaethes*.

The following act of parliament, which Lord Coke calls the shortest he ever met with, was passed in the fifth year of Henry IV. : " None from henceforth shall use to multiply gold or silver, or use the craft of multiplications, and if any the same do, he shall incur the pain of felony." (Watson's *Chemical Essays*.)

distillations, and was engaged during a period of twelve years, in a series of fruitless and unmeaning operations upon alum, common salt, and copperas. At length he quitted his native country for Italy; thence he proceeded to Spain and Turkey, in search of the adepts of the art, from whom he hoped to acquire the secret, and reimburse himself. Thus having squandered the scanty remains of his broken fortune, and reduced nearly to beggary, he retired to the isle of Rhodes, where he entered the service of Arnold of Villa Nova, from whom he states that he obtained that which he so long searched for. So true is that definition of Alchemy, which describes it as an art without principle, which begins in falsehood, proceeds in labour, and ends in beggary.

Entering upon the seventeenth century, the historian of Experimental Science must ever pause to pay a tribute of gratitude and respect to the celebrated Francis Bacon; a man whose faults as a statesman have been eclipsed to the eyes of posterity, by the brilliancy and excellence of his philosophical character.

It may commonly be observed, that those who are gifted by nature with superiour genius or uncommon capacity,—who are destined to reach the meridian of science, or to attain exalted stations in the learned professions, have exhibited early symptoms of future greatness; either indefatigable industry, or extraordinary sagacity, or ardent enthusiasm, have marked their entrance into the affairs of life. At the age of sixteen, Bacon was distinguished at Cambridge; and, very shortly afterwards, struck with the frivolous subtilty of the tenets of Aristotle, he appears to have turned his mind into that channel, which led on to future eminence. The solid foundation of his scientifick character is the *Instauration of the Sciences*. It opens with a general and philosophical survey of the subject; whence he pre-

ceeds to infer the futility of the ancient philosophical systems, and to point out Induction, from sober and severe experiments, as the only road to truth. Pursue this, he says, and we shall obtain new powers over nature ; we shall perform works as much greater than were supposed practicable by natural magick, as the real actions of a Caesar surpassed the fictitious ones of a hero of romance.

Speculative philosophy he likens to the lark, who brings no returns from his elevated flights ; experimental philosophy to the falcon, who soars as high, and returns the possessor of his prey.

Illustrations of the new method of philosophizing, and the mode of arranging results, conclude this admirable and unrivalled performance.

To do justice to this work, we must, for a moment, forget the present healthy and vigorous constitution of science, and view it deformed and sickly in the reign of Elizabeth. We shall then not be surprised at the irrelative observations and credulous details, which occasionally blemish this masterly production of the human mind.

But the history of Lord Bacon furnishes other materials for reflection. Upon the accession of James I., he became successively possessed of the highest honours of the law, and acquired great celebrity as a publick speaker and a man of business ; yet, amidst the harassing duties of his laborious avocations, he still found time to cultivate and adorn the paths of science, the pursuit of which furnished employment for his scanty leisure, and relaxation in his professional toils ; and, when ultimately disgraced, “his genius, yet unbroken, supported itself amidst involved circumstances and a depressed spirit, and shone out in literary productions.” Nor should the munificence of his royal master remain unmentioned, who, after remitting his fine, and releasing him from his prison in the Tower, conferred on him a large pen-

sion, and used every expedient to alleviate the burden of his age, and to blunt the poignancy of his sufferings.

After the death of Lord Bacon, which happened in April 1626, in the 66th year of his age, the records of science began to assume a brighter aspect ; and we discern true knowledge emerging from the dungeons of scholastick controversy, and shaking off the shackles of polemical learning.

The philosophers by fire, as the Chemists were emphatically termed, no longer exclusively engaged in seeking for the elixir of life, and the stone of transmutation, began to direct their endeavours towards more attainable and useful objects. . They availed themselves of the accumulated facts collected by the misguided zeal and barren labours of their predecessors, and combined these useless and unseemly materials into the foundations of a beautiful and useful department of knowledge ; but their progress was slow, and not unfrequently interrupted by relapse into the follies of Alchemy.

Glauber of Amsterdam,¹ and in this country, the Honourable Robert Boyle, are characteristick writers of the middle of the seventeenth century. The former has detailed many curious and interesting facts respecting neutral salts, acids, and animal and vegetable substances ; but his descriptions are darkened by the language of the adepts, and valuable truths are disguised by being blended with the unintelligible jargon of the black art.

The perusal of Glauber's chemical works leads to some surprise at the multitude of facts with which he was acquainted, and, among them, we meet with discoveries which have been considered of modern date. He particularly

¹ A collection of Glauber's works, in Latin, was published at Frankfort, in 1658, in 8vo, and in 1659 in 4to. An English translation was published at London, in 1689, by C. Pack.

describes the production of vinegar during the destructive distillation of wood. (*Miraculum Mundi*, p. 1.) The following may be selected from among many similar passages in his writings, as exhibiting the active and original turn of mind of this keen and curious inquirer, and as containing the germ of many truths which have been more fully developed in our own time.

“ But what other things the said juice of wood is able to effect, we cannot here declare, by reason of our intended brevity ; yet this I will add, that, if this acid spirit be rectified, it may be used in the preparation of good medicines ; in mechanick arts ; in the making of many fair colours from the extraction of metals, minerals, and stones ; and for all things for which common vinegar is used ; yea, far more commodiously, because it much exceedeth common wine and beer vinegar in sharpness.”

He also mentions the tar produced in the same process, which he recommends as efficacious in preserving wood that is exposed to weather, and speaks of it, when mixed with ashes, as a profitable and quickly acting manure. He further points out the method of concentrating the vinegar of wood by exposure to cold, “ which freezes the phlegm only, but the sharp spirit is not turned into ice, but remaineth in the middle of the hogshead, so sharp that it corrodeth metals like aqua-fortis. If hop-poles be dipped in the oil, it not only preserves them, but fattens the plant ; and as insects abhor these hot oils, if they be applied to the bark of fruit trees, it will defend them from spiders, ants, canker-worms, and other insects ; by this means also, rats and mice may be prevented from creeping up hovel posts, and devouring the grain.” Glauber details a number of experiments relating to the action of this vinegar of wood, on limestone, and notices the use of its compounds ; and that he was accurately acquainted with its superiour acidity, ap-

pears from the following quotation : “ It is said that Hannibal made a passage through the Alps for himself and his army, softening the rocks by the benefit of vinegar. What vinegar that was, histories do not mention. Perhaps it was the vinegar of wine ; but if he had had the vinegar of wood, he might sooner have attained his desire.”

These shrewd remarks and useful observations are thickly scattered through the verbose pages of Glauber. He enriched the laboratory with new agents, and into medicine he introduced several new and useful remedies. Upon the arts he bestowed many improvements, and was among the first who seriously endeavoured to benefit agriculture by the medium of experimental chemistry.

Boyle¹ has left voluminous proofs of his attachment to scientific pursuits, but his experiments are too miscellaneous and desultory to have afforded either brilliant or useful results ; his reasoning is seldom satisfactory ; and a broad vein of prolixity traverses his philosophical works. He was too fond of mechanical philosophy to shine in Chemistry, and gave too much time and attention to theological and metaphysical controversy to attain any excellence in either of the former studies. He who would do justice to Boyle’s scientific character, must found it rather upon the indirect benefits which he conferred, than upon any immediate aid which he lent to science. He exhibited a variety of experiments in publick, which kindled the zeal of others more capable than himself. He was always open to conviction ; and courted opposition and controversy, upon the principle that truth is often elicited by the conflict of opinions. His

¹ Boyle was born in January 1627, at Lismore, in the province of Munster, in Ireland. He was educated at Eton, and afterwards travelled in Italy, Switzerland, and France, and returned to England in 1644. In 1668 he took up his residence in London ; and in 1680 was elected President of the Royal Society. He died on the 30th of December 1691, aged 65.

disposition was ever amiable, mild, and generous, and he was at once the patron of learning and of virtue.

The merit of bringing Hooke¹ before the publick, and of pointing out to him the road to eminence, is chiefly due to Mr. Boyle, who, in the troublesome and bigotted periods of the commonwealth and protectorship, associated himself with a few philosophical friends at Oxford, for the purpose of promoting experimental inquiry. Hooke, who enjoyed the advantage of having been educated at Westminster school, under Dr. Busby, was introduced in the year 1655 to this select society, where his original and inventive genius was soon discerned and called into action. Boyle engaged him as his operator and assistant, and his talents were turned with great success, to the invention and improvement of philosophical instruments, and to many important subjects connected with the mechanical arts.

It was about this period that the physical properties of the atmosphere began to attract notice, and that the favourite scholastick notion of Nature's abhorrence of a vacuum was called into question. Galileo was, perhaps, the first

¹ Sir Godfrey Copley, in a letter written about the time of Hooke's death, says, "Dr. Hooke is very crazy; much concerned for fear he should outlive his estate. He hath starved one old woman already, and, I believe, he will endanger himself to save sixpence for any thing he wants." In another, written a few weeks after his death, Sir Godfrey says, "I wonder old Dr. Hooke did not choose rather to leave his 12,000*l.* to continue what he had promoted and studied all the days of his life,—I mean mathematical experiments, than to have it go to those whom he never saw nor cared for. It is rare that virtuosos die rich, and it is pity they should, if they were like him." (*Dr. Ducarrel's MSS.* quoted in *Biog. Dict.*) Hooke sometimes declared, that he intended to dispose of his estate for the advancement of natural knowledge, and to promote the ends for which the Royal Society was instituted; to build a handsome edifice for the Society's use, with a library, laboratory, and repository, and to endow a professorship. (*Life by Waller.*)

who broke this spell of Aristotelian philosophy; and in the year 1644, the grand discovery of atmospherick pressure, and its variation, was announced by Torricelli, the celebrated inventor of the barometer.¹ The idea of constructing a machine for the purpose of rarefying air, first occurred to Otto Guericke, who, after many fruitless attempts, succeeded by means of a sucking pump, in withdrawing a considerable portion of air from the interior of a copper ball. With this awkward and imperfect air-pump, he performed several notable experiments. One of these is often exhibited at the present day. It consists in exhausting a hollow brass globe, composed of two hemispheres, closely fitted to each other. When a portion of the interior air is removed, the pressure of the exterior atmosphere is such, as to resist considerable force applied to separate the hemispheres. This is called the Magdeburgh experiment, and was first publickly exhibited in the year 1654 before the deputies of the empire, and foreign ministers assembled at the diet of Ratisbon. This original air-pump, invented by the Burgomaster of Magdeburgh, was greatly improved by Hooke, who, in conjunction with Boyle, performed by its means a variety of new and important experiments, illustrative of the mechanical properties of the atmosphere, which, at a subsequent period,

¹ The Peripateticks maintained, that the creation of a vacuum was impossible, even to supernatural power. This dogma was first shaken by a circumstance which happened to some workmen employed by the Grand Duke of Tuscany. Having sunk a deep well, they endeavoured to bring the water to the surface by a common sucking pump, but found, to their surprise, that they could only make it ascend to the height of about 30 feet. Galileo, whose talents had gained him great celebrity and respect, was consulted in this emergency. His answer was, that, although nature does dislike a vacuum, there is a certain limit to her antipathy, equivalent to the pressure of a column of water eighteen palms high.

tended considerably to the progress of pneumatick chemistry.

The works of Hooke, chiefly interesting to the chemist, are his *Micrographia* and *Lampas*, the former published in 1664, the latter in 1677. They contain anticipations of many of the subsequent changes and improvements of chemical theory, which will be noticed in a future page of this history.

Both the private and publick character of Dr. Hooke exhibit many faults, and are stained with many blemishes. His temper was peevish, reserved, and mistrustful; and he wanted that candour and dignity of mind which should raise the philosopher above the level of ordinary men. He was born at Freshwater, in the Isle of Wight, in 1635, and died in London in the year 1702.

Immediately after the Restoration, the gentlemen who formed the Philosophical Society at Oxford adjourned to London, where they held their meetings in Gresham College, and considerably extended the number of their members. The King, who himself loved science, countenanced and patronized their proceedings; and, on the 15th of July 1662, granted a royal charter, constituting them a body corporate, under the name of *The Royal Society of London, for promoting Natural Knowledge*. In the year 1665 was published the first number of the *Philosophical Transactions*, of which work, justly regarded as the standard of English science, a volume has been published annually since the year 1762.

This laudable and rare example of Charles the Second was followed by Lewis the Fourteenth of France; and in the year 1666 the *Royal Academy of Sciences* was instituted at Paris, under the immediate protection of that monarch. Neither was the patronage cold, nor the honours empty, which were bestowed by Lewis on the fol-

lowers of science. Salaries he conferred upon scientifick bodies, and pensions upon learned men, “a generosity,” says Hume, “which does great honour to his memory, and in the eyes of all the ingenious part of mankind will be esteemed an atonement for many of the errors of his reign. We may be surprised,” continues the historian, “that this example should not be more followed by Princes, since it is certain that bounty so extensive, so beneficial, and so much celebrated, cost not this monarch so great a sum as is often conferred upon one useless overgrown favourite or courtier.” Happily for the scientifick character of Britain, the genius, talents, and exertions of individuals have ever been sufficient to counterbalance such advantages; and thus nurtured and protected, the growth of science has not been less rapid or vigorous than where she has enjoyed the sunshine of royal favour.

With the great and unrivalled name of Newton, we close the records of the seventeenth century. To him Chemistry is indebted for the first correct views respecting the nature of combination; a subject which had little engaged the attention of the more sensible experimentalists of the preceding periods, and which was formerly attributed to the occult qualities of the Aristotelians, and afterwards to the mechanical forms of the particles of bodies.¹

Chemical affinity was referred by Newton to the different attractive powers of the different kinds of matter in regard to each other. Salt of tartar becomes moist by exposure to air, because that salt attracts the humidity of the atmosphere. Muriatick acid unites with salt of tartar by virtue of their respective attractions; but when oil of

¹ We shall again have occasion to refer to certain chemical opinions of Newton. In the present instance, reference is made to the thirty-first query annexed to the *Third Book of Opticks*. (Newton, *Opera Omnia*, 4to, Lond. 1782.)

vitriol is poured upon this compound, the former acid is displaced by the superiour attraction of the latter. Silver dissolved in aqua-fortis is separated from that menstruum by the superiour attraction of quicksilver; in like manner copper separates quicksilver; and iron, copper. Referring to these and other similar instances, “does not this” says he “argue, that the acid particles of the aqua-fortis are attracted more strongly by iron than by copper, by copper than by quicksilver, and by quicksilver than by silver?” Such are the simple but clear, and, in most instances, correct suggestions, relating to the subject of attraction, which Chemistry owes to the great luminary of Mechanical Philosophy.

In tracing the history of Chemistry from early times, through the dark ages, to the beginning of the last century, I have noticed only such authors as conduced by the weight or novelty of their writings, the importance of their discoveries, or the example of their zeal, to the more immediate progress and elucidation of this department of philosophy. The annals of a period so extensive must necessarily record a host of experimentalists, to whose researches it would upon the one hand be impossible to do justice; and whose names, on the other, it would be useless to repeat. It may however be remarked, that alembicks, and other complex distillatory apparatus, were employed by the alchemical physicians who flourished between the ninth and thirteenth centuries. Mesue mentions the distillation of rose-water, and the production of spirit of wine is noticed by Raymond Lully. At this time, too, furnaces of peculiar construction, and a variety of complex apparatus and accoutrements, were introduced into the laboratory.

During the fifteenth and sixteenth centuries, Alchemy was at its acmé, and many were the unwary and avaricious

who were entrapped by the golden prospects and plausible mysticism of the art. Among them was that admirable artist Mazzuoli of Parma, better known under the name of Parmagiano.

Curious discoveries and useful inventions multiplied rapidly during the seventeenth century. Kunckel, in Saxony, successfully promoted the Chemistry of the Arts. In 1669, Brandt of Berlin discovered Phosphorus, and about the same time Homberg accidentally produced a spontaneously inflammable compound, which he called Pyrophorus. In 1674 the elder Lemery acquired great and deserved fame at Paris as a chemical lecturer. He was the first who threw aside the affected and pompous diction habitually indulged in by his predecessors and contemporaries, and adopted a simple and perspicuous style, which at once tended to the ready diffusion of his subject, and to its permanent popularity. When he published his course, "it sold" says Fontenelle "like a novel or a satire."

The establishment of literary and scientific societies during this age was another grand step towards the promotion of knowledge, and the period was particularly propitious to their progress. Bacon, Galileo, and Kepler, had opened that road to truth which was so eagerly and successfully pursued by Boyle, Hooke, and Mayow, in this country, and in which the miraculous mind of Newton displayed its brilliant powers. In Germany, Beccher and Stahl are entitled to particular mention. The suggestions of the former, who was a man of an acute and inquisitive turn of mind, led the latter into that train of speculation which terminated in producing the Phlogistick Theory, and which will presently be more particularly considered. Homberg, Geoffroy, and the two Lemerys, were zealous followers of experimental chemistry in France, at the

establishment of the Royal Academy of Sciences. In short, the independent zeal and healthy activity in scientific pursuit, which has since marked its progress in Europe, became manifest early in the seventeenth century; and the causes I have attempted to unfold contributed to the splendour which it began to acquire about the end of that important era in the general history of the world. The clouds of ignorance and error quickly dispersed before this happy dawn of true knowledge; and science, no longer enveloped in scholastic mystery and absurd speculation, began to display those inherent charms, which gained her the courtship and admiration of every liberal and cultivated mind, and which laid the foundation of that extended dominion which she acquired in the succeeding age.¹

SECTION. II.

STATE OF CHEMISTRY AT THE OPENING OF THE EIGHTEENTH CENTURY.—OPINIONS OF BECCHER AND STAHL RESPECTING THE PHENOMENA OF COMBUSTION, COMPARED WITH THE VIEWS OF REY AND MAYOW.—PNEUMATICK CHEMISTRY OF HAILES AND BOERHAAVE.—INVENTION OF THE THERMOMETER.

THE history of the progress of Chemistry during the seventeenth century presents many active and able inquirers, whose researches tended to develop new properties and combinations of bodies; but their attempts at theory

¹ Those who are desirous of consulting the alchemical authors, and of becoming particularly acquainted with the titles of their voluminous productions, will find a curious body of information on these subjects in the *Histoire de la Philosophie Hermetique*, Paris, 1742.—Gobet's *Anciens Mineralogistes*, published at Paris in 1779, gives some details of the early progress of Mineralogical Chemistry in France.

and generalization were, with few exceptions, absurd and abortive. They consisted in wild hypothesis and vague speculation, and were founded, not upon the sober and steady basis of truth, but upon the unreal and tottering visions of the imagination. The spirit of Lord Bacon was slow in animating experimental philosophy, until Newton rose to surprise and illumine the world. It then assumed a new and cheerful aspect, and quick was its growth, and illustrious its progress, under the invigorating influence of that sun of science.

Although Chemistry does not lie under the same weighty obligations to Newton as mechanical philosophy, he conferred upon it a great and lasting benefit, by the disclosure of those clear and simple views which have already been alluded to.¹ The important deductions, too, which flow in

¹ The following passages, in addition to the previous observations in the text, will be sufficient in illustration of Newton's views of *Elective Attractions*.

“Have not the small particles of bodies certain powers, virtues, or forces, by which they act at a distance, not only upon the rays of light, for reflecting, refracting, and inflecting them, but also upon one another, for producing a great part of the phenomena of nature? for, it is well known, that bodies act one upon another by the attractions of gravity, magnetism, and electricity; and these instances show the tenor and course of nature, and make it not improbable that there may be more attractive powers than these. For nature is very consonant and conformable to herself. How these attractions may be performed I do not here consider; what I call attraction may be performed by impulse, or by some other means unknown to me. I use that word here to signify only, in general, any force by which bodies tend towards one another, whatsoever be the cause. For we must learn from the phenomena of nature, what bodies attract one another, and what are the laws and properties of the attraction, before we inquire the cause by which the attraction is performed. The attraction of gravity, magnetism, and electricity, reach to very sensible distances, and so have been observed by vulgar eyes, and there may be others which reach to so small distances as hitherto escape observation, and perhaps electrical attraction may reach to such small distances even

easy perspicuity from his experimental researches, soon became general models of imitation; and the new style which we discern in the philosophical authors of the early part of the eighteenth century throughout Europe, may, in a great measure, be referred to the lofty example before us.

No sooner was the spell of Alchemy broken, than the phenomena of combustion began to attract the notice of the

without being excited by friction. For, when salt of tartar runs *per deliquium*, is not this done by an attraction between the particles of the salt of tartar and the particles of the water which float in the air in the form of vapours? And why does not common salt, or saltpetre, or vitriol, run *per deliquium*, but for want of such an attraction? Or why does not salt of tartar draw more water out of the air than in a certain proportion to its quantity, but for want of an attractive force after it is satiated with water? And whence is it but from this attractive power that water, which alone distils with a gentle and lukewarm heat, will not distil from salt of tartar, without a great heat? And is it not from the like attractive power, between the particles of oil of vitriol and the particles of water, that oil of vitriol draws to it a good quantity of water out of the air; and, after it is satiated, draws no more, and in distillation lets go the water very difficultly? And when the water and oil of vitriol, poured successively into the same vessel, grow very hot in the mixing, does not this argue a great motion in the parts of the liquors? And does not this motion argue that the parts of the two liquors, in mixing, coalesce with violence, and, by consequence, rush towards one another with an accelerated motion? And when *aqua-fortis*, or spirit of vitriol, poured upon filings of iron, dissolves the filings with a great heat and ebullition, is not this heat and ebullition effected by a violent motion of the parts?" &c. "When spirit of vitriol, poured upon common salt or saltpetre, makes an ebullition with the salt, and unites with it, and, in distillation, the spirit of the common salt or saltpetre comes over much easier than it would do before, and the acid part of the spirit of vitriol stays behind;—does not this argue that the fixed alcały of the salt attracts the acid spirit of the vitriol, more strongly than its own spirit; and, not being able to hold them both, lets go its own?"—Newton's *Opticks*, Opera omnia, 410, Lond. 1782.

early chemical theorists. The influence of the air upon this process had been long observed, and many of the changes suffered by the combustible, had been examined with a surprising degree of acuteness and precision; for fire was almost the only agent employed at that period to effect combination and decomposition. These inquiries constitute a prominent feature in the history of Chemistry. It may therefore be requisite to pursue them with a minute attention, which may at first appear tedious, but which will gain in importance and interest as they proceed.

The first speculations in theoretical Chemistry deserving attention, are those of John Joachim Beccher of Spires, who died in England in 1685. He gained considerable celebrity at Vienna and Haerlem, for improvements in arts and manufactures, but was induced to retire to this country, in consequence of the jealousy of rivals, and the neglect of those upon whom he had conferred benefits. His works abound in shrewd and witty remarks, and in deep and curious reasoning,—in frivolous subtilty, and in weighty and sensible observations. His hypothesis respecting the origin of the varieties of matter, from the mutual agencies and combinations of a few elementary principles, though unnecessarily blended with scriptural history, are characterized by considerable brilliancy of thought and originality of invention. They are detailed at great length in his *Physica Subterranea*, which treats on the original creation of matter, and the transition and interchange of elements. The *Institutiones Chemicæ*, or *Œdipus Chemicus*, of this author, is another curious production, containing the history of the chemical elements, and describing the leading operations of the laboratory. Earth was the favourite element of this philosopher, of which he supposed three varieties to exist, namely, a vitrifiable, a metallick, and an inflammable

earth. Of these the various productions of nature were formed.¹

But the most celebrated chemical theorist of the latter part of the seventeenth century is Ernest Stahl, born at Anspach in Franconia, in 1660. He adopted many of the opinions of Beccher respecting the cause of inflammability, and upon these foundations reared the celebrated System of Phlogiston, according to which, inflammability is supposed to depend upon the presence of a highly subtile and elastick matter, which, at certain temperatures, is thrown into violent motion, and appears under the form of flame or fire. Combustion is the separation of this principle, and bodies contain it in various proportions. Charcoal, for instance, when burned, leaves scarcely any residuum, and is, therefore, nearly pure phlogiston. Antimony, when burn-

¹ Beccher wrote voluminously upon a great variety of subjects. His principal chemical works are as follows.

1. *Oedipus Chemicus*. 2. *Metallurgia, de generatione, refinatione, et perfectione Metallorum*. 3. *Physica Subterranea*, and its various appendices. 4. *Parnassus Medicinalis Illustratus*. 5. *Laboratorium Portabile*. 6. *Chymischer Rosen-garten*.

Beccher's *Oedipus* is dedicated to Francis Sylvius Deleboë, who, in 1658, was elected the first Professor of Medicine in the University of Leyden. He was a man of an acute mind, as appears from his various essays and tracts, more especially from his *Praxeos Med. Idea Nova*. He died at Leydon in 1672. "Utilissimum profecto munus subiisti, quo tui auditores non verba sed corpora, non chymericos terminos, verum ipsas reales enchyrises, non inanes denique et immateriales facultates, sed a te demonstrati, effectus causas practicas audiunt, vident, tangunt." Beccher every where compliments him as a man not of words, but of deeds; as a philosopher, who eminently sought to render science popular and intelligible to all capacities.

The language of Beccher's *Physica Subterranea* is sufficiently inelegant and incorrect. "Excuso *Latinitatem* in hoc opere," says he, "quam *barbaram* esse fateor, ob materiem et ob scriptionem, in specie scriptionis modum: ex ore enim dictantis totum opus conceptum est. Sic *rebus* attentus, *verba* neglexi." This is at once an example and apology.

ed, affords a large proportion of earthy matter. If this earth be heated with charcoal, or other matter abounding in phlogiston, antimony is regenerated; this metal, therefore, is a compound of earth and phlogiston.

If sulphurick acid, which is not inflammable, be distilled with oil of turpentine, which is extremely so; or, in other words, if phlogiston be added to sulphurick acid, sulphur is obtained. Sulphur, therefore, is a compound body, consisting of sulphurick acid and phlogiston. If sulphur and common soda be fused together, a brown compound is obtained, formerly called liver of sulphur, and the same product results when charcoal is heated with Glauber's salt, which consists of soda combined with sulphurick acid. Such was Stahl's explanation of the phenomena of combustion, and such the apparently plausible experimental proofs upon which it was founded.¹

In Germany and in France, the phlogistick doctrine was received with that thoughtless and eager enthusiasm which suffers the blaze of novelty to eclipse the steady light of truth, and which is rather captivated by plausible exterior than by internal excellence. Even in this country the experiments of Boyle and of Hooke, if not forgotten, were over-looked, and hypothesis for a time gained the ascen-

¹ Stahl's doctrines are very ably set forth in his *Three Hundred Experiments*, published at Berlin in 1731; and in his *Fundamenta Chemiae*, Nuremberg, 1723 and 1732. He observed the necessity of air to combustion, and considered flame or fire as resulting from its violent ethereal agitations. Stahl is continually urging circumspection in hypotheses, yet preconceived opinions are always leading him to erroneous conclusions, as the following passages amply prove. "Aer ignis est anima, hinc, sine aere nihil potest accendi vel inflammari."—Aer in motum excitatus, seu ventus artificialis, vel etiam naturalis, mirum excitat motum aetheris, seu flammam; hinc ad ignem fusorium, et vitrificatorium, promovendum, foliibus opus est; imo gradus et vehementia ignis dependet multum ex aeris admissione." *Fund. Chem. dogmat. et ration.* p. 22.

dancy over facts; for it had been most satisfactorily demonstrated by those experimentalists, that bodies will not burn if air be excluded, and that, during combustion, a portion of the air is consumed by the burning body. Even at an earlier period, the same observation had been most pointedly dwelt upon, and another equally important circumstance ascertained, namely, the increase of weight sustained by metals during their calcination. As early as 1629, Brun, an Apothecary, resident in the town of Bergerac in France, melted two pounds six ounces of tin, and in six hours the whole was converted into a calx, which weighed seven ounces more than the tin employed. Brun, surprised at this circumstance, communicated it to John Rey,¹ a physician of Perigord, who, in 1630, published a Tract upon the subject, in which he refers the increase of weight to the absorption and solidification of air: "Thus," says Rey, in the fanciful language of the period, "have I succeeded in liberating this surprising truth from the dark dungeons of obscurity; which was vainly but laboriously sought after by Cardan, Scaliger, Fascius, Caesalpinus, and Libavius. Others may search for it, but in vain, unless they pursue the royal road which I have cleared. The labour has been mine,—the profit is the reader's,—the glory is from above."

But amongst the authors whose researches tended to conclusions diametrically opposite to those of Stahl and his associates, and whose writings abound in anticipations of

¹ *Essays de Jean Rey, Docteur en Medecine, sur la Recherche de la Cause pour laquelle l'Estain et le Plomb augmentent de poids quand on les calcine.* Paris, 1777.

Of these curious essays, originally printed in 1630, a copy was discovered in the Royal Library at Paris in 1776. The scarcity of the first edition is in some measure accounted for in the "Advertisement" to the present, but the rarity of this reprint is very enigmatical.

modern discoveries, no one stands so conspicuous as our countryman John Mayow.¹ His tracts, published at Oxford in 1674, relating to chemical, physiological, and medical subjects, abound in traits of original and inventive genius, and furnish the prototype of many discoveries, which have conferred great and lasting renown upon succeeding labourers in the field of Chemistry. It is the treatise upon nitre and the nitro-aerial spirit to which I principally allude, and of which it may be proper to give a short but connected sketch.

The atmosphere, he observes, contains a certain nitro-saline matter, a spirit, vital, igneous, and fermentative, which exists in, and may be obtained from nitre; that it supports combustion, but is itself incombustible; that it exists in nitrick acid; that when antimony is exposed to the joint operation of heat and air, it imbibes the nitro-aerial particles, whence its increase in weight; and that a similar change may be effected by nitre or by nitrick acid; that acidity depends upon the absorption of the same principle which in sulphurick acid is combined with sulphur, either during combustion, or during the exposure of pyrites to air: that fermentation is referable to a very similar cause: that it is necessary to vegetation, and present in all cases of combustion; that it is absorbed by animals during respiration; and that the same substance which contributes to the support of flame, is likewise required for the support of life. Mayow also was acquainted with the

¹ Mayow was born in Cornwall in 1645, and died in London in 1679, at the early age of thirty-nine. Dr. Beddoes and Dr. Yeats have asserted Mayow's claims to several modern discoveries; and in many other instances than those quoted in the text, he has certainly anticipated both the discoveries and inventions of some of his chemical successors. All Mayow's tracts are deserving of attentive perusal and are of full knowledge. The first and second, *De Sal-nitro et Spirito Nitro-aerio* and *De Respiratione*, contain a vast body of chemical facts, resulting from well conceived and conducted experiments.

evolution of air during the action of nitrick and vitriolick acids upon iron, and points out a mode of collecting it, in bottles inverted in vessels of the dilute acids. He observes that the air generated in these experiments, although expansible by heat, is probably different from the atmosphere, as is also the air which an animal has breathed, and in which a candle has burned.

These are a few of the important facts dwelt upon by Mayow, respecting the nature of the atmosphere, and of the cause of combustion. That they were not at the time opposed to the purely speculative notions of Stahl is truly remarkable, for they explain, in conjunction with the observations of Rey and others, the great obstacle to the phlogistick hypothesis, the increase of weight in the burning body ; they show the real cause of the necessity of the presence of air, which, if combustion consisted in the mere evolution of the subtile principle of fire, could not be required ; and they adduced experimental evidence, where Stahl merely surmised.

Another active inquirer occurs in this page of chemical history ; one whose researches cleared the way for the great discoveries of the succeeding era, and to whom the merit is justly due of having opened a mine in the field of nature ; who indulged, not in the speculative and metaphysical frivolities which characterize the productions of most of his predecessors, and many of his contemporaries, but followed nature with a steady and unerring step, and recorded his observations in a concise, unadorned and unaffected style. This was the Reverend Dr. Stephen Hales.¹ He was the first who instituted researches into

¹ Born in 1677 ; died in 1761. Dr. Hales is one of the few divines who have employed their abundant leisure in philosophical and experimental researches. It is said that he refused high preferment upon more than one occasion, in order that he might attend to his humble parochial duties, and continue his scientific pursuits.

the physiology of vegetation, a subject which he pursued with considerable ardour and perseverance. He also made a variety of experiments upon the extrication of air during the exposure of animal, vegetable, and mineral substances to heat. In perusing his Essays on these subjects, we frequently find him upon the verge of those splendid discoveries which fell to the lot of his fellow-labourers and successors; but the erroneous nature of his preconceived opinions induced him to take for granted that which experiment should have determined, and to rest satisfied with results which, had they been followed up, would inevitably have led to the most important and novel facts. His experiments do credit to his industry, but his conclusions betray feebleness of judgment. If, instead of regarding the various gaseous products obtained from the substances he operated upon, as consisting of common air contaminated by their effluvia, he had submitted them to more close investigation, he would doubtless have run a more brilliant and successful career. He is justly regarded as the founder of Pneumattick Chemistry, but he contributed few materials to the superstructure.

Herman Boerhaave,¹ of Leyden, who was a contemporary of Hales, pursued a similar train of inquiries; but,

He directed his attention to the quantity of moisture imbibed and emitted by different plants, and to the circulation of the sap, which, he says, put him upon making a more particular inquiry into the nature of a fluid which is so absolutely necessary for the support of the life and growth of animals and vegetables.

His *Specimen of an Attempt to analyse the Air by Chymiostatical Experiments* displays extraordinary ingenuity in the contrivance of experiments and apparatus. It was his misfortune to consider the various gases which he procured as mere modifications of atmospherick air. *Philos. Trans. Statical Essays*, London, 1731.

¹ Boerhaave was born in December 1668, at a village near Leyden. He died in September 1738. He was an eminent

although many of his experiments were new and well conceived, he was not more happy in his conclusions, nor more fortunate in his discoveries. He attributed the elasticity of air to its union with fire, and considered its ponderable matter as susceptible of chemical combinations; but the existence of different aeriform fluids escaped his notice.

ornament of medicine, as well as of chemical science. His oration upon resigning the office of Governour of the University of Leyden has been justly eulogised by Johnson. (*Life of Boerhaave.*) He here declares in the strongest terms (says his elegant biographer) in favour of experimental knowledge, and reflects with just severity upon those arrogant philosophers, who are too easily disgusted with the slow methods of obtaining true notions by frequent experiments, and who, possessed with too high an opinion of their own abilities, rather choose to consult their own imaginations than inquire into nature, and are better pleased with the charming amusement of forming hypotheses than the toilsome drudgery of making observations.

The emptiness and uncertainty of all those systems, whether venerable for their antiquity, or agreeable for their novelty, he has evidently shown; and not only declared, but proved, that we are entirely ignorant of the principles of things, and that all the knowledge we have is of such qualities alone as are discoverable by experience, or such as may be deduced from them by mathematical demonstration.

Boerhaave's contributions to physick were large and valuable. His principal chemical work is the *Elementa Chemiae*, of which a good translation, with notes, was edited in 1753 by Dr. Shaw. This work he dedicated to his brother, who was intended for the medical profession, but went into the church; while Boerhaave, who originally studied divinity, relinquished it for physick and chemistry. Alluding to this circumstance, "Providence," says he, "has changed our views, and consigned you to religious duties, while I, whose talents were unequal to higher objects, am humbly content with the profession of physick."

In the *Elementa*, and in several of his Orations, are admirable remarks upon the useful application of Chemistry to other branches of knowledge. His observations upon its usefulness and necessity to the medical practitioner, may be well enforced at the present day; for, excepting in the Schools of London and Edinburgh, Chemistry, as a branch of education, is either entirely neglected, or, what is perhaps worse, superficially and

The philosophers whose names have been now recorded, not only greatly added to the stock of chemical facts collected by their predecessors, but conferred new life and vigour upon the science by their occasional incursions into the regions of theory and rational speculation:--in this light, the works of Rey, Mayow, and Stahl, deserve particular attention; the two former for correctness and precision, the latter for boldness and ingenuity.

About this period the Thermometer was brought to perfection, which tended materially to the progress of that most refined and difficult branch of Chemical Philosophy, relating to the nature and effects of heat. The researches, on this subject, will presently form an important feature in our history, which renders it proper to notice this instrument of such consequence in their prosecution.

That bodies change in bulk, with variations of temperature, must have been noticed at a very early period; but there can be little doubt, that the idea of constructing an instrument for measuring these variations first occurred to Santorio,¹ Professor of Medicine, in the University of Padua, in the beginning of the seventeenth century; he is also celebrated for his Medico-statical experiments, which are well burlesqued in one of the early numbers of the *Spectator*.²

imperfectly taught. This is especially the case at the English Universities, and the London Pharmacopœia is a record of the want of chemical knowledge, where it is most imperiously required.

¹ Santorio was born in 1561 at Capo d'Istria, on the borders of the Gulf of Trieste. He died at Venice in 1636. His *Ars de Statica Medicina* was published at Venice in 1614. Much merit is due to the steady perseverance with which he opposed the occult remedies of the empiricks of his day.

² No. 25. By Addison.

Santorio's thermometer consisted of a tube, blown at one end into a bulb, and with the other open extremity immersed into water. In cold weather the confined air contracted and the water rose in the tube—in a warm atmosphere the air expanded and the fluid fell. Santorio observed some other particulars connected with the operation of this thermometer, among which the increased influence of the sun's rays, when the bulb was blackened, deserves notice.

The Academicians del Cimento, whose early labours have already been mentioned, materially altered and improved the thermometer, by employing a liquid to measure temperature, instead of air, the changes of bulk in which, in a moderate range of temperature, are so considerable as to render the instrument extremely bulky and otherwise inconvenient. They generally used spirit of wine, and fixed a scale of degrees to the tube, with a view to ascertain its variations in bulk with greater precision. These instruments soon acquired considerable celebrity, and were largely circulated under the appellation of the Florence Glass. In this state the uses of the thermometer were extremely limited, no two instruments corresponded, and there being a free communication between the fluid and the external air, it was liable to evaporation,—yet was this thermometer much preferable to the over-sensible and bulky instrument of Santorio. There was another objection to spirit of wine, arising out of the readiness with which it assumes an elastick state, and which renders it unfit for measuring temperatures even below the heat of boiling water. Sir Isaac Newton, therefore, suggested the use of linseed oil, which, however, is extremely ill adapted to the purpose, on account of its unctuousity, and the ease with which it solidifies. Quicksilver was first recom-

mended by Roemer,¹ the eminent Danish philosopher, who discovered the motion of light; it was also employed by Dr. Halley, and is now generally used. The advantages of this fluid metal in the construction of the thermometer are manifold; it retains its liquid state at very high and very low temperatures, and has the peculiar excellence of expanding very equally for equal increments of heat, which is far from the case with spirit of wine.

But the great improver of the thermometer was Fahrenheit,² a merchant of Dantzic, who, having failed in business, and being attached to chemical and mechanical pursuits, was obliged to gain a livelihood by making and selling these instruments. Fahrenheit used both spirit of wine and quicksilver, and hermetically sealed the tube containing the fluid; he also greatly improved the method of graduation, by establishing two points as the extremes of his scale, and subdividing the intermediate portion into a given number of degrees.

The division of the thermometrick scale had occupied the attention of several learned and ingenious men; but it was Fahrenheit who pointed out the most accurate means of accomplishing this purpose. The curious circumstance of the water running from melted snow being always of the same temperature, appears first to have occurred to Güricke of Magdeburgh, but was first applied to the graduation of thermometers by Sir Isaac Newton. Dr. Hooke had observed that the quicksilver in the tube of the thermometer, plunged into boiling-water, always rose to the same height; accordingly, if a mercurial thermometer be put into melting snow, and the point at which the

¹ Born at Arhusen in Jutland, in 1644,—died at Copenhagen in 1710.

² Born at Dantzic in 1686,—died in 1724.

fluid stands, marked upon the tube, and then transferred to boiling water, and that point also marked, and if the intermediate space be subdivided into any number of equal degrees, 100 for instance, it follows that, provided proper precautions have been taken in selecting and filling the tube, every thermometer, so constructed, will indicate the same degree, when applied to bodies of the same temperature. With regard to the boiling point, Fahrenheit observed it to differ under different degrees of atmospherick pressure, and pointed out the necessity of fixing it at a mean barometrical altitude. He had also noticed, that a degree of cold much more intense than that of ice might be procured by a mixture of snow and salt; and conceiving this to be extreme cold, he commenced his scale from that point, which is 32° below the freezing of water. Accordingly, Fahrenheit's scale commences at 0° , the temperature of his freezing mixture; the freezing point of water is marked 32° , and the boiling point 212° ; the space between the freezing and boiling of water being divided into 180° . The graduation of thermometers received its greatest improvement in 1742, by Celsius of Sweden, who commenced the scale at the freezing of water, and divided the space between it and the boiling point into 100° . This is the centigrade scale, now used in France. Reaumur's scale, in which the point of congelation is marked 0° , and that of boiling-water 80° , is used in some parts of the European Continent; and in Russia the descending scale of Delisle is sometimes employed, in which the boiling point of water is 0° , the freezing 150° . These scales have each their merits and defects. In the event of innovation, the interval between the freezing and boiling of mercury, might be divided into 1000 equal parts; the former being 40° below 0° of Fahrenheit, the latter about $+670^{\circ}$. The degrees would thus be sufficiently small to be expressed without fractions; and the commencement of

the scale, which is about the lowest natural temperature, would be so low, as to preclude the frequent necessity of expressing negative degrees.¹

From this sketch of the history of the thermometer, it is obvious, that its operation depends upon the circumstance of fluids diminishing in bulk by diminution of temperature, and the contrary; which is really the case with all fluids except water. This important fact was observed by the Florentine Academicians in their early experiments, and it is among the most curious and interesting discoveries of that zealous and active association of experimentalists. Having filled a large thermometer tube with water, they plunged it into a mixture of salt and snow. The water presently began to contract in bulk, and descend in the tube; but, instead of continuing to do so, till it reached the freezing point, after a short time it commenced expanding; the expansion went on till a portion of the water froze, and was then very suddenly increased.²

¹ This proposal is suggested by Mr. Murray. *System of Chemistry*, Vol. I.

² The following unaffected narrative of this celebrated experiment is very different from the usual verbose and pompous style of the philosophers of the period.

“Già sapevamo per innanzi (e lo sa ognuno) che il freddo da principio opera in tutti i liquori restrignimento, e diminuzione di mole, e di ciò non solamente n’avevamo la riprova ordinaria dell’ aquarzente de’ Termometri, ma n’avevamo fatta esperienza nell’ acqua, nell’ olio, nell’ argentovivo, ed in molt’ altri fluidi. Dall’ altro canto sapevamo ancora, che nel passaggio, che fa l’acqua dall’ esser semplicemente fredda al rimuoversi dalla sua fluidità, e ricever consistenza, e durezza coll’ agghiacciamento non solo ritorna alla mole, ch’ ell’ aveva prima di raffreddarsi, ma trapassa ad una maggiore, mentre se le veggon rompere vasi di vetro, e di metallo con tanta forza. Ma qual poi si fosse il periodo di queste varie alterazioni, che in essa opera il freddo, questo non sapevamo ancora, ne era

The temperature at which water thus begins to expand by cooling is 40° Fahrenheit, and water cooled down to 32° , that is, 8° below 40° , occupies the same space as when heated to 8° above 40° ; in other words, the density or specifick gravity of water is at its maximum at 40° .

When in the year 1683 Dr. Croune repeated this experiment before the Royal Society, Hooke attributed the effect, not to any peculiarity in expansibility of water, but to a rapid and sudden contraction of the glass bulb, which would force the water upwards in the tube;¹ a con-

possibile d'arrivarvi con agghiacciarla dentro a' vasi opachi, come quei d'argento, d'ottone, e d'oro'ne' quali s'era fin' allora agghiacciata: Onde per non mancare di quella notizia, che pareva esser l'anima di tutte quest' esperienze, ricorremmo al cristallo, ed al vetro, sperando per la trasparenza della materia d'aver presto ad' assicurarci come la cosa andasse, mentre si poteva a ciascun movimento, che fosse apparso nell' acqua del collo, cavar subito la palla dal' ghiaccio, e riconoscer in essa quali alterationi gli corrispondessero. Ma la verità si è, che noi stentammo assai più che non ci saremmo mai dati ad intendere, prima di poter rinvenire alcuna cosa di certo intorno a' periodi di questi accidenti. E per dirne più distintamente, il successo è da sapere, che nella prima immersione, che facevamo della palla, subito, ch'ella toccava l'acqua del ghiaccio s'osservava nell' acqua del collo un piccolo sollevamento, ma assai veloce, dopo il quale con moto assai ordinato, e di mezzana velocità s'andava ritirando verso la palla, finchè arrivata a un certo grado non proseguiva più oltre a discendere, ma si fermava quivi per qualche tempo, a giudizio degli occhi, offatto priva di movimento. Poi a poco a poco si vedea ricominciare a salire, ma con un moto tardissimo, e apparentemente equabile, dal quale senz' alcun proporzionale acceleramento spiccava in un subito un furiosissimo salto, nel qual tempo era impossibile tenele dietro coll' occhio, scorrendo con quell' impeto, per così dire, in istanti le decine e le decine de' gradi." *Esperienze intorno al progresso degli artificiali agghiacciamenti, e de' loro mirabili accidenti. Saggi di naturali esperienze fatte nell' accademia Del Cimento.* Firenze, 1691.

¹ The *Histories of the Royal Society* by Sprat and Birch, contain a curious body of experimental evidence on a great varie-

clusion amply disproved by other forms of the experiment, especially by that suggested by Dr. Hope¹ of Edinburgh, in which a freezing mixture was applied to the surface of water at 60° contained in a tall cylindrical glass jar. The water was cooled throughout to 40°, and then the surface sunk to 32°, and froze. But when the freezing mix-

ty of philosophical subjects, and detail the opinions and observations of many eminent persons upon the various researches that were carried on before that learned body. The business of the Society was formerly conducted upon a very different plan from that now pursued, and much resembled the present proceedings of the Academy of Sciences of the Royal Institute of France.

The following is Dr. Birch's memorandum relating to this experiment :

February 6, 1683.

A letter of Mr. Musgrave to Mr. Aston, dated at New College, Oxford, was read, containing, among other things, several experiments about freezing, as that two inches of water in a tube $\frac{1}{2}$ inch diameter, expanded itself, upon freezing, $\frac{5}{6}$ higher; that a tube one inch diameter filled 6 inches, rose upon freezing, $\frac{7}{8}$ of an inch; and that half a pint of water, upon freezing, lost in weight 3ij. ʒij. gr. viij.

Dr. Croune said, that having weighed three ounces of water, he found it, after freezing, to differ a scruple and a half.

Sir Christopher Wren remarked, that if water were suddenly frozen, there would be less difference in weight.

Dr. Croune said, that he observed water which he had put into a bolt-head, to rise higher before there was any thing of freezing in it.

Mr. Hooke attributed the rising of the water in the neck of the bolt-head, to the shrinking of the glass.

Dr. Croune said, that the glass had been long in the cold before, and that the water rose immediately.

Dr. Wallis proposed, that an empty glass might be cooled well in a freezing liquor, in order that it might have its contraction before the water be put into it.

This was done immediately by Mr. Hunt, and the water being put into a small bolt-head, rose about ** of an inch in the neck, though the air at that time was very warm. (Birch's *History of the Royal Society*. Vol. IV. p. 253.)

¹ *Edinburgh Transactions*, Vol. VI.

ture was applied to the bottom of the jar, the water became cooled throughout to 32° . If the cold be applied to the centre of the vessel, as long as the water is above 40° , the warmer part will always be at the top, but below 40° the arrangement is reversed, and the warmer part being then most dense, occupies the lower half of the vessel, and the colder portion floats upon it.

The influence of this singular anomaly, which has thus been demonstrated by unanswerable experiments, is of great extent and importance. In most of the cases in which nature deviates from her usual established laws, philosophy has discovered happy consequences in her aberration; and where such discovery has not been made, investigation should be upon the alert to trace the clue that is presented.

If water were obedient to the same laws of refrigeration as other less universal liquids, such as spirit, oils, and quicksilver, it must be evident, that, during the winter's cold, our rivers and lakes, instead of presenting a superficial stratum of ice, would soon become solid throughout; the continuous influence of the summer's sun would be required to produce their fluidity, and the inhabitants of the waters would annually risk extermination.

These effects are obviated by the peculiarity observed by the Academicians del Cimento. As the temperature of the earth is in winter always greater than that of the atmosphere, the cooling of large bodies of water must take place from above, by the contact of cold air and chilling blasts. The whole mass will thus be lowered to 40° , after which, the water becoming specifically lighter as it becomes colder, remains upon the surface where it sinks to 32° , and is converted into a film of ice, which being a bad conductor of heat, thickens slowly, and affords further protection to the warmer fluid beneath. Those

who in winter's cold accidentally fall through the ice, are surprised by the comparative warmth of the water below, and the aquatick animals that in summer sport upon the surface of their element, retire in winter to the more genial retreats which nature has thus provided.

In tracing the progress of Chemistry through its dark and early periods, the historian necessarily traverses a rugged and barren path ; his chief object must be to advance, and the shortest is generally the safest road. Reaching the age of Alchemy, the prospect, though improved, is not such as to demand a very deliberate survey : its fictions, however, like those of romantick chivalry, have somewhat of reality for their basis, and by the mere increase of experimental inquiry, contributed essentially to the growth of chemical knowledge. As a science, its progress was languid until the middle of the seventeenth century, when it began to shake off the lethargy in which it had been sunk, and was turned with eager curiosity to new and more useful objects.

In the dross of the alchemical furnaces many scattered treasures were discovered, the value of which was greatly enhanced by arrangement and systematick combination. New views were thus opened to the Experimentalist ; and authors, dismissing the florid exuberances and pompous affectation of their predecessors, cultivated an unadorned and simple style, more becoming the dignity of scientifick narration.

These circumstances contributed to confer a prosperous aspect on Chemical Philosophy at the commencement of the eighteenth century. It was applied to the arts, and to them it gave an unexpected and vigorous impulse. It was directed to the investigation of nature, and there it discovered new beauties. It found "tongues in trees, books in the running brooks, sermons in stones, and good in every thing."

SECTION III.

DISCOVERIES OF DR. BLACK, RELATING TO THE CAUSE OF CAUSTICITY
IN EARTHS AND ALKALIES, AND TO CERTAIN PHENOMENA OF HEAT.

THE discoveries of Dr. Joseph Black form a most important epoch in the history of Chemical Philosophy; they embrace two leading subjects,—the one relating to the causticity of the earths and alkalies—the other to the operation of heat in changing the state of bodies; in rendering solids liquid; and converting liquids into elastick or aeriform fluids.

Regarding these researches as isolated specimens of inductive philosophy, they have rarely been equalled: as influencing the progress of Chemistry, by disclosing the hidden cause of many very intricate phenomena, they have never been surpassed; and, by a happy combination of circumstances, we trace in them the distant but fertile source of those gigantick improvements of the arts, in which the perfection of the steam-engine is involved.

Of a man whose scientifick character is thus pre-eminence, and in whose attainments his country has just reason to exult, history has recorded a brief but interesting memorial.¹

Dr. Joseph Black was sprung from a Scottish family, transplanted first to Ireland and then to France, where he was born in 1728, on the banks of the Garonne. When twelve years of age, he was sent for education to Belfast, and afterwards to the University of Glasgow, where he entered upon the study of physick, under the guidance of that bright ornament of medical science, Dr. William Cullen. In 1750, he removed to Edinburgh; four years af-

¹ Dr. Robison's Preface to Black's *Lectures on the Elements of Chemistry*.

terwards, he took the degree of Doctor of Physick ; and, in 1756, published his Experiments on Magnesia, Quicklime, and some other alkaline substances, in the *Physical and Literary Essays*. In the same year, Dr. Cullen having removed to Edinburgh, Dr. Black returned to Glasgow to fill the Medical and Chemical chair of that University, where he was received with open arms both by the Classes and Professors. In 1764, he brought his ideas respecting the combinations of heat with ponderable matter to perfection. Speculations upon this subject had occupied his mind during a considerable period, but the difficulties of the inquiry, and the time necessarily consumed in other professional avocations, had considerably interfered with the pursuit.

In 1766, he was appointed to the Chemical Chair of Edinburgh, an office which he filled with such talent, industry, and perseverance, as not only drew an immense course of hearers to his class, but tended to confer upon chemistry a degree of popularity and importance, which has been greatly conducive to its promotion and extension. "His discourse," says his biographer, Professor Robison, "was so plain and perspicuous, his illustrations by experiment so apposite, that his sentiments on any subject never could be mistaken; and his instructions were so clear of all hypothesis or conjecture, that the hearer rested on his conclusions with a confidence scarcely exceeded in matters of his own experience."¹ In short, Dr. Black, in his

¹ Dr. Black's character as a lecturer, is given by his friend Professor Robison in the following terms:—"He endeavoured every year to render his courses more plain and familiar, and to illustrate them by a greater variety of examples in the way of experiments. No man could perform these more neatly and successfully. They were always ingeniously and judiciously contrived, clearly establishing the point in view, and never more than sufficed for this purpose. While he scorned the

professorial capacity, was entitled to every praise, and he contributed most essentially to the foundation and increase of the reputation which the University of Edinburgh has acquired and maintained. Nor was his private character at variance with his publick excellence; he was mild, amiable, and fond of conversation, whether serious or sportive; and he was not above uniting to the highest philosophical attainments, most of the elegant accomplishments of life. In his advanced age he often expressed a hope that he might not linger in protracted sickness, on account of the distress which, in such cases, is suffered by attending friends; and his death, which happened in his 71st year, in November 1799, is on this account the more remarkable. He was taking some milk and water, and having the cup in his hand, when the last stroke of his pulse was to be given, had set it upon his knees, and in this attitude expired without the smallest agitation.

The writings of Black, though lamentably few, are masterpieces of scientific composition. Newton was his model, and he was the first who transferred into chemistry the severe system of inductive logick, which marks the productions of that great master of natural philosophy.

quackery of a showman, the simplicity, neatness, and elegance with which they were performed, were truly admirable. Indeed, the *simplex munditiis* stamped every thing that he did. I think it was the unperceived operation of this impression that made Dr. Black's lectures such a treat to all his scholars. They were not only instructed, but (they knew not how) delighted; and without any effort to please, but solely by the natural emanation of a gentle and elegant mind, co operating indeed with a most perspicuous exhibition of his sentiments, Dr. Black became a favourite lecturer, and many were induced, by the report of his students, to attend his courses, without having any particular relish for chemical knowledge, but merely in order to be pleased. This, however, contributed greatly to the extending the knowledge of Chemistry, and it became a fashionable part of the accomplishments of a gentleman." *Preface*, p. li.

“In no scientifick inquiries, since the date of the *Principia* and *Opticks*, do we find so great a proportion of pure ratiocination, founded upon the description of common facts, but leading to the most unexpected and important results, as in the two grand systems of Black.” Averse to all hypothesis, and aware of the multitudinous facts upon which a theory that is to stand firm must be founded, Dr. Black was unwarrantably slow in the formal public disclosure of his admirable researches. His tenets were fully and freely delivered to his pupils; but he very rarely intruded upon the publick as an author; and his splendid achievements in the philosophy of heat are chiefly developed in his posthumous works. This silence, arising out of an over-cautious modesty which marked all his proceedings, was not favourable to the reputation of Dr. Black. Faulty and incomplete copies of his lectures were circulated among his friends and admirers, which afterwards reached the hands of those who deserve another name, and by whom they were not very honourably employed.

The first researches of Dr. Black, which it will be necessary to attend to, explain the cause of causticity in earths and alkalies. When chalk or limestone, which are mild insoluble tasteless substances, are heated to redness in the open fire, they are converted into quicklime, a body corrosive, soluble in water, and having an acrid flavour. Stahl, Macquer,¹ and Meyer, attributed this change to

¹ Macquer was born at Paris in 1718, and died in 1784. He ranks among the most eminent scientifick Chemists of the early part of the eighteenth century; and though involved in the errors of the Phlogistick school, he has written with much good sense and perspicuity on a variety of chemical subjects. His most celebrated works are, the *Elemens de Chimie Theorique*, Paris, 1749; and *Elemens de Chimie Pratique*, Paris, 1751. He also published

some substance absorbed from the fire,—to an acrid acid,¹ —to phlogiston, and other creatures of the imagination. Dr. Black's mind was turned to this subject in consequence of the discovery of magnesia. This substance made its first appearance as an Arcanum in Italy, in 1707. Valentine showed that it might be obtained from the mother-liquor of nitre, but it was supposed to be lime, until Hoffman, in 1720, pointed out several peculiarities by which it is distinguished from that earth. Hoffman prepared magnesia from bitters, or the saline liquor which remains after the separation of common salt from sea water; to this he added an alkali which precipitated the earth.² The

a Chemical Dictionary. The following is all his information respecting the property possessed by quicklime of rendering the alkalies caustick. After describing the process, he observes, “Le but de cette operation, est de réunir avec le sel alcali fixe ce que la chaux a de salin et d'âcre.”——“On le combine avec la partie la plus âcre, la plus subtile, et la plus saline de la chaux.”——“Nous n'entreprendrons point ici d'expliquer pourquoi le sel alcali, que l'on combine avec la chaux, acquiert une si grande causticité. Cette question nous paroît une des plus délicates et des plus difficiles à résoudre que nous offre la Chimie. Elle tient à celle des propriétés alcalines de la chaux, et on ne peut guères espérer de la résoudre, que quand on aura acquis sur la nature de cette substance, beaucoup plus de lumières que nous n'en avons à présent.” *Elemens de Chimie Pratique*, pp. 179. 182.

¹ J. F. Meyers, *Chemische versuche zur nähern erkenntniss des ungelöschten kalks ; der elastischen und electrischen Materie, des allerreinsten feuerwesens, und der ursprünglichen allgemeinen saure*. Hannover, 1764. In this dissertation, though published subsequently to Black's essay, the causticity of the alkalies and lime is referred to the absorption of a principle which the author calls *Causticum*, or *Acidum pingue*. Between the years 1760, and 1772, a great variety of dissertations were published in Germany upon this question, some in support of Black's doctrine, others in favour of Meyer's hypothetical absurdities. See Gren's *Systematisches Handbuch der Gesammten Chemie*. Halle, 1794. § 437.

² *Observ. Phys. Chem.* 1722.

substance which thus exists in bittern, is a compound of magnesia and sulphurick acid. It was first obtained from certain mineral springs in the neighbourhood of Epsom in Surry, and thence called Epsom salt, but was sold at a very high price, in consequence of the small quantities so procured, until the manufacturers in the neighbourhood of Lymington obtained it from sea water; it was then largely exported to the Continent under the name of English salt.

Epsom salt was indeed long confounded with Glauber's salt, and a fraud of the manufacturers here, and in Germany, tended to keep up the confusion; for at that period Glauber's salt was rare in England, and large crystals of Epsom salt were sold under that name; but in Germany, where Epsom salt was not common, Glauber's salt, in small crystals, was vended as English or Epsom salt. Pott of Berlin, and Du Hamel of Paris, were led into a comedy of errors in consequence of mistaking the nature of these bodies.

Dr. Black found that, when magnesia was prepared by precipitating a solution of Epsom salt by a mild alkali, that it effervesced with acids; but that when heated to redness, it lost weight, and then dissolved without effervescence. This fact, which also holds good in respect to lime, induced him to believe that, instead of gaining any

Hoffman was the most celebrated Chemical Physician of the age. He was born at Halle in Saxony, in 1660, and died in 1742. His writings, which are voluminous, are also valuable. In 1749, they were eked out by the Genevese Booksellers into nine folio volumes. The following are his leading Essays in Chemistry :

Dissertationes de Generatione Salium,—De Natura Nitri,—De Cinnabare Antimonii,—De Mirabili Sulphuris Antimonii fixati efficacia,—De Mercurio et Medicamentis Mercurialibus. Observationum Physico-Chemicarum Collectio. Libri iii.

thing in the fire, something was lost by these earths. He, therefore, distilled some magnesia in a retort, but found, that although it lost weight as before, nothing but a relatively small quantity of water was found in the receiver. The experiments of Dr. Hales now rushed into his mind, and it occurred to him, that some gaseous or aeriform body had escaped from the earth, and that this was the cause of its effervescing with acids,—a circumstance previously ascribed to the collision of the acid and earthly particles. He therefore put some magnesia, not calcined, into a bottle, with a bent tube attached to it; and thus, during the action of the acid, obtained a large quantity of an elastick fluid, in a vessel inverted in water; he found, too, that chalk, and common alkali, yielded the same kind of air. The air thus existing in these substances Dr. Black called fixed air; and he proved it to be the cause of mildness in earths and alkalies. If lime be added to a mild alkali, the lime absorbs its fixed air, and renders it caustick,—an effect formerly attributed to the transfer of the fiery particles of the lime.

In the year 1750, Venel observed that Selters, and other sparkling waters, when placed under the receiver of an air-pump, gave out a large quantity of air, and became flat and insipid, and he imitated them by dissolving common soda in water, and adding muriatick acid, which produced an effervescence and gave it briskness.¹ These experiments were a little antecedent to Dr. Black's publication, but they by no means anticipated his discover-

¹ “En 1750, Venel, Professeur de Chimie à Montpellier, reprit le fil de ses expériences en arrêtant dans l'eau le fluide dégagé des effervescences, et en imitant ainsi, par sa dissolution artificielle, les eaux minérales acidules; *mais il fit encore tous ses efforts pour prouver que c'étoit de l'air.*” Fourcroy, *Histoire*, p. 28.

ies.¹ In 1764 the conclusions of Black were verified, and his views extended, by Dr. Macbride of Dublin, who pointed out several new properties of fixed air, and demonstrated its existence in the atmosphere; for lime exposed to air gradually loses its causticity, and becomes effervescent. The operation of quick-lime as a manure depends upon its power of rendering the inert vegetable matter of the soil soluble, and fit for the nourishment of young plants; an effect which it does not produce when combined with fixed air, or in the state of chalk: hence the lime should be spread quickly over the land, and not left in heaps exposed to the air, by which, as Dr. Macbride has shown, it is rendered mild, and of comparatively small effect.²

¹ Dr. Brownrigg of Whitehaven threw out some curious hints respecting fixed air, or, as it is now called, carbonick acid, as early as 1765. In a communication to the Royal Society, printed that year in their *Transactions*, he remarks, “that a more intimate acquaintance with those noxious airs in mines, called *damps*, might lead to the discovery of that subtile principle of mineral waters, known by the name of their *spirit*; that the mephitick exhalations termed the Choak-damp, he had found to be a fluid permanently elastick; and, from various experiments he had reason to conclude, that it entered the composition of the waters of Pyrmont, Spa, and others, imparting to them that pungent taste, from which they were denominated *acidulae*, and likewise that volatile principle on which their virtues chiefly depend.”

Mr. Lane was the first who ascertained the solubility of iron in water, impregnated with fixed air. *Phil. Trans.* 1769. “By this means,” says Sir John Pringle in his discourse on the different kinds of Air, delivered at the anniversary meeting of the Royal Society, November 30, 1773, “the nature of the metallick principle in mineral waters was clearly explained, and the whole analysis of those celebrated fountains, so often attempted by Chemists and others, and still eluding their laboured researches, was thus, in the most simple manner, brought to light.”

² Macbride’s *Experimental Essays*, 1764. The merit of this performance induced the University of Glasgow to bestow the degree of Doctor of Physick on the author.

Such are the principal features of Dr. Black's researches respecting the cause of mildness and causticity in earthy and alkaline substances. They constitute an important body of chemical evidence, and are established upon the satisfactory basis of analytick and synthetick proofs.

I now turn to his more elaborate investigation into the effects of heat; to inquiries so momentous in their influence upon the advancement of experimental philosophy, so replete with difficulties, and so masterly in their execution, as to raise them to the highest efforts of the human mind. I have deemed a rapid glance at the discovery of fixed air sufficient for our present purpose; for occasions will afterwards offer of descanting more largely upon its nature and properties; but the investigation now before us, is that from which the towering and durable greatness of Black's name has been principally derived; and it was begun, continued, and completed, by the labour of his own hands.

In speaking of the graduation of thermometers, it was mentioned, that if snow or ice be brought into a warm atmosphere, and suffered to thaw slowly, the water which runs from it is always at one temperature, that of 32° of Fahrenheit's scale. This and similar cases seem to have occupied the early thoughts of our philosopher; for his biographer informs us, that, in the oldest parcels of his notes, he found queries relating to this subject. How does it happen that, although heat is constantly flowing from surrounding bodies to the ice, its temperature is not increased? Water at 32°. when brought into a room at 60°. goes on increasing in temperature till it attains that of

Dr. Macbride introduced some important improvements into the art of Tanning, and was the first who employed lime water in the preparatory operations of that process. He was born in the county of Antrim in 1726, and died in 1778.

the circumambient air ; but the ice, though exposed to exactly similar sources of heat, remains at 32° . Why, when water is cooled several degrees below its freezing point, does its temperature suddenly rise to that point, the instant that it congeals ? or why is it, that, when a vessel of water is put upon the fire, a thermometer plunged into it continues to indicate increase of heat until it rises to 212° ; and the water then boils, but does not become hotter, although it remains upon the fire, and has all its former opportunities of acquiring heat ? Such were the queries which Dr. Black has most happily resolved.

In regard to the liquefaction of ice, he has demonstrated that, when solids pass into the liquid state, the change is always accompanied with the absorption of heat, which is concealed or becomes latent in the liquid, and is not indicated by the thermometer, which instrument, therefore, is no measure of the absolute quantity of heat. A variety of interesting and curious experiments were undertaken with a view to ascertain the quantity of thermometrick heat, which thus becomes latent during the conversion of ice into water. A pound of snow at 32° was mixed with a pound of water at 172° ; the snow was melted, and the temperature of the mixture was only 32° ; so that here 140° thermometrick heat had disappeared ; their effect being, not to raise the temperature of the snow, but to convert it into water. We should say, therefore, from this experiment, that water at 32° is a compound of ice, and 140° of heat as indicated by the thermometer. If water, at the temperature of 32° , be mixed with an equal weight of warm water, suppose at 200° , the resulting temperature will be the mean ; $232 \div 2 = 116$; but if we use ice, the temperature will not be the mean, for 140° of heat must be subtracted from the warm water, which heat is consumed in liquefying the ice ; the result, therefore, will

be the same as if water at 32° and 60° were mixed, giving a mean of only 45° .

These experiments at once demonstrated the cause of many facts respecting the production of heat and cold, which, though long known, remained without any plausible explanation.

When solids become fluids, the production of cold is more or less evident, according to the rapidity of the change. Those saline bodies, for instance, which are very rapidly soluble in water, generate during their solution a considerable intensity of cold, for to become fluid they must absorb heat. When snow and salt are suddenly blended, there is an instant liquefaction, and the temperature of the substances being already low, a degree of cold equal to 0° of Fahrenheit is obtained. The production of cold by mixing snow and muriate of lime, a very soluble salt, is— 40° Fahrenheit, and sufficient to freeze quicksilver even in a comparatively warm atmosphere. A mixture of 5 parts of sal ammoniack in powder, and 5 parts of nitre with 16 of water, sink the thermometer from 50° to 10° . Equal parts of nitrate of ammonia, and water, produce a more intense cold, and by a clever successive application of these freezing mixtures, the intense degree of cold of— 91° Fahrenheit has been artificially exhibited. This is 123° below the freezing of water, and 40° the greatest natural cold hitherto observed, which was at Hudson's Bay, where the spirit thermometer has been seen at 50° .

There are many counter illustrations of this doctrine of latent heat; in which heat is evolved during the conversion of liquids into solids. If oil of vitriol be poured upon magnesia, there is a sudden solidification of the acid by its union with the earth, and a considerable rise of temperature ensues. Water poured upon quicklime produces

a similar phenomenon; and when water at perfect rest is exposed in a covered vessel to an intensely cold atmosphere, its temperature may be reduced to many degrees below its freezing point: A slight agitation causes it suddenly to become ice, and at that instant the temperature rises to 32° . A somewhat similar case is the sudden crystallization of saline solutions, during which their latent heat becomes sensible to the feeling, and is indicated by the thermometer.

In Dr. Black's theory of latent heat, it is assumed that heat is matter; that it is a substance of excessive tenuity, existing in variable proportions in bodies; that when in a free state, it affects our senses, and the thermometer, but that it occasionally enters into union with other substances, or is separated from them, consistent with the usual laws of chemical attraction. Thus, in fluids, it is combined or latent, but when they are converted into solids, it is separated in a free or sensible state. The other view of the question represents heat as the result of a vibrating motion among the particles of bodies; the vibrations being most rapid and extensive in the hottest bodies. In fluids the vibrations are accompanied by a motion of the particles round their own axes; and when solids pass into the fluid state, the vibratory motion or temperature is in part lost, by the communication of the rotatory motion to the particles. Each of these hypotheses has had its able defenders and advocates; the ideas of Newton seem to have been favourable to the latter, and many facts may be adduced in its support. The strongest are the imponderability of heat, and its continuous extrication by friction. That we discover no increase of weight in a heated body may be attributed to the insufficiency of our instruments, but its unlimited production in a variety of

cases, though consonant with the hypothesis of vibration, ill agrees with that of a specifick form of matter.

If a soft iron nail be beaten upon the anvil, it becomes hot and brittle, and it cannot again be rendered malleable till it has been resoftened by exposure to the fire. By those who favour the notion of a matter of heat, this has been called an *experimentum crucis*. The matter of heat, say they, is squeezed out of the nail, as water out of a sponge, but it is reabsorbed in the fire. In this experiment, however, it must be recollected, that the mechanical arrangement of the particles of the iron is considerably altered; it is rendered very brittle; and hence, perhaps, its insusceptibility of becoming again hot, till restored to its former state or texture by the expansive power of fire.

It was not until the publication of the researches which have just been considered, that a variety of curious circumstances concerning congelation were understood. The gradual progress in the freezing of large bodies of water has been shown to depend in some measure upon the remarkable anomaly respecting its maximum of density; but it is also materially connected with the phenomena of latent heat; for water, before it can become ice, must part with a quantity of heat, which if suddenly evolved, would raise the thermometer 140° . It must also be obvious, that the process of thawing suffers a similar retardation, for ice requires for its conversion into water, the absorption of 140° . of sensible heat.

Thus we see that sudden congelation and sudden liquefaction are alike prevented; that the process must be gradual, and consequently productive of none of those evils which would result from a more rapid change.

One of the great advantages of irrigation, or meadow watering, is also explained by a reference to these principles. In an irrigated meadow, the surface of the water

may be frozen ; but as water at 40° is heavier than at 32° , the former will be its temperature in contact with the grass ; and it is a temperature perfectly congenial to the functions of vegetable life. Sir Humphrey Davy examined the temperature in a water meadow near Hungerford, in Berkshire, by a very delicate thermometer. The temperature of the air, at seven in the morning, was 29° . The water was frozen above the grass ; the temperature of the soil at the roots of the grass was 43° . Thus, by the peculiarity in the refrigeration of water, by the defence afforded by the stratum of ice, and by the laws of congelation, the vegetables are not merely protected from the effects of an intensely cold atmosphere, but likewise from the injurious influence of sudden changes of temperature.

Congelation is to surrounding bodies a source of heat, and there is no inconsiderable mitigation of the extreme cold of air wafted over large bodies of water, by the transfer of latent to sensible heat, which must occur before they can freeze.

The theory of freezing mixtures has led to considerable improvements of their applications, and many new and curious discoveries have resulted in pursuing this inquiry. Indeed whatever tends to disclose the laws of nature, cannot ultimately fail of subjecting her more or less to the uses of life, and of manifesting more and more the wisdom of the creator.

Having established the above facts respecting the cause of fluidity, Dr. Black proceeded to the second part of his inquiry, relating to vaporisation, and pursued it with the same abilities and success.¹ Finding the thermometer to

¹“ When we heat a large quantity of a fluid in a vessel, in the ordinary manner, by setting it on a fire, we have an opportunity of observing some other phenomena which are very in-

remain stationary at 212° in boiling water, he conceived the process of ebullition to be in some respects analogous to that of liquefaction, and that the heat which did not raise the temperature of the water, entered into union with it, and became latent in the steam. If this were the case, it should be re-evolved during the condensation of steam; and thus a method was devised of ascertaining its thermometrick quantity. Dr. Black's experiments on this subject were very numerous. I shall allude to such as put

structive. The fluid is gradually heated, and at last attains that temperature which it cannot pass without putting on the form of vapour. In these circumstances, we always observe, that it is thrown into the violent agitation which we call boiling. This agitation continues as long as we throw in more heat, or any of the fluid remains, and its violence is proportional to the celerity with which the heat is supplied.

“Another peculiarity attends this boiling of fluids, which, when first observed, was thought very surprising. However long and violently we boil a fluid, we cannot make it in the least hotter than when it began to boil. The thermometer always points at the same degree, namely, the vaporifick point of that fluid. Hence the vaporifick point of fluids is often called their Boiling point.

“When these facts and appearances were first observed, they seemed surprising, and different opinions were formed with respect to the causes upon which they depend. Some thought that this agitation was occasioned by that part of the heat, which was more than the water was capable of receiving, and which forced its way through, so as to occasion the agitation of boiling; others, again, imagined, that the agitation proceeded from air, which water is known to contain, and which is now expelled by the heat. Neither of these accounts, however, is just or satisfactory; the first is repugnant to all our experience in regard to heat: we have never observed it in the form of an expansive fluid like air: it pervades all bodies, and cannot be confined by any vessel, or any sort of matter; whereas, the elastick matter of boiling water, can be confined by external pressure, as is evident in the experiments made with Papin's digester.”

This quotation from Black's *Lectures*, (Vol. I. p. 153,) is inserted to show the state of the argument respecting the phenomena of ebullition previous to his researches.

the phenomenon in the clearest light, and are perfectly unconnected with hypothesis.

He noted the time consumed for raising a certain quantity of water to its boiling point, and then kept up the same heat till the whole was evaporated, and marked the time consumed by the process. It was thus easily computed what the temperature would have been, supposing the rise to have gone on above 212° in the same ratio as below it. The water was originally at 50° ; it boiled in four minutes, and in twenty minutes was all evaporated. In four minutes, therefore, it had gained 162° for $50^{\circ} + 162 = 212$; and in twenty minutes would have gained $162 \times 5 = 810^{\circ}$; which may, therefore, be considered as the equivalent thermometric expression of the latent heat of the steam. Another good illustration of the absorption of heat in the production of steam, is furnished by heating water under compression. It may then be raised many degrees above its ordinary boiling point; but, on removing the pressure, a portion of steam rushes out, and the remaining water has its temperature lowered to 212° .¹

Hence we learn, that the conversion of water into vapour is attended with a great loss of heat to the surrounding bodies; and although the perceptible temperature of water and steam are identical, the latter contains heat equivalent to between 800 and 900° of perceptible or thermometric temperature. When steam is reconverted into water, this large quantity of heat is again given out; and hence a small portion of steam is capable of heating a large body of water to its boiling point. The knowledge of this fact is of great economical importance; and in breweries and other manufactories, where large bodies of water are required to be

¹ See Black's Experiments, which prove the absorption of heat. *Lectures*, Vol. I. p. 157, &c.

boiled, the steam, instead of being suffered, as formerly, to pass off into the air, is conveyed by pipes into other vessels of water, which it heats during its condensation. In the same way, rooms and houses are warmed by the heat evolved during the condensation of steam, in iron or copper tubes which traverse the building, and the method is at once safe and effectual.

It is in consequence of the latent heat of steam, that, in the process of distillation, we are obliged to present so large a surface for condensation; and it is not difficult, by the help of a still, to calculate the latent heat of steam. If, for instance, one hundred gallons of water at 50° be mixed with one gallon at 212° , the temperature of the water will be raised above $1\frac{1}{2}^{\circ}$. If, by the common still-tub, one gallon of water be condensed from the state of steam by one hundred gallons of water at 50° , in that case the water will be raised 11° , which is about $9\frac{1}{2}^{\circ}$ more than in the former instance. Hence it appears, that the heat imparted to a hundred gallons of cold water by eight pounds of steam, would, if it could be condensed into one gallon of water, raise it to 950° .

The average of the various experiments, which have been made on this subject, warrants us in placing the latent heat of steam between 900° and 1000° .

These facts demonstrate that the condensation of vapour is always a heating process, and that its formation must equally be attended with the production of cold.

¹ About the year 1774, it was observed by Dr. Cullen, that a thermometer moistened with spirit of wine or ether,

¹ "The Chemistry of Stahl, as it was cultivated in Germany, and France, and other countries of Europe, scarcely aspired beyond the bounds within which it had been circumscribed by its original founder. A few important facts, indeed, were added, but they were either connected with medical preparations, or attracted attention solely as objects of curiosity. The great and tempting field of Philosophical Chemistry lay unexplored, when it was

sinks many degrees during the evaporation of those fluids ; with others, the thermometer may be made to fall from 60° to 0°. The cause of this is sufficiently explained by Dr. Black's theory ; the ether and spirit readily pass into vapour, which requires a certain quantity of heat for its production ; this is taken from the bodies it happens to be in contact with, as from the thermometer or the hand ; hence the cold perceived when these fluids are applied to the body, and the advantage which results from their application in cases of burns, and inflammations. These circumstances led Dr. Cullen to accelerate the evaporation of these fluids, by exposing them under the receiver of the air-pump ; by placing a flask half full of ether in a tumbler of water, it was found that, during the process of exhaustion, the evaporation was so rapid from the ether in the flask, as to convert the surrounding water into ice.¹

entered upon with ardour by Dr. Cullen, who first perceived its value, and whose genius and industry, had they not been turned into another channel, would, in all probability, have been crowned with the richest discoveries. But though Dr. Cullen soon abandoned his chemical pursuits for those of medicine, he was fortunate enough to have initiated into the science, a man whose discoveries formed an era in chemistry, and who first struck out a new and brilliant path, which was afterwards fully laid open, and traversed with so much eclat by the British philosophers who followed his career. This fortunate pupil of Dr. Cullen, was Dr. Joseph Black." *Thompson, History of the Royal Society*, p. 468.

Dr. Cullen's fame as a promoter of chemistry has been lost in his greater celebrity as a teacher of medicine. "Chemistry," says his biographer, Dr. Anderson, "which was, before his time, a most disgusting pursuit, was, by him, rendered a study so pleasing, so easy, and so attractive, that it is now pursued by numbers as an agreeable recreation, who, but for the lights that were thrown upon it by Cullen and his pupils, would never have thought of engaging in it at all."

Cullen was born in Lanarkshire, in 1712, and died at Edinburgh in 1790.

¹ Dr. Cullen's paper is published in the *Physical and Literary Essays and Observations*, Edinburgh, 1756. Vol. II. It con-

This part of the philosophy of heat, regarded in its connexion with the phenomena of nature, opens pleasing views of her order and economy. In the constant evaporation from the earth's surface, from rivers, lakes, and the sea, we discern an unfailing cause of equalization of heat ; the vapour thus formed, ascending to colder regions, there becomes a source of increase of temperature, and, re-assuming fluidity, is thrown upon the earth in fertilizing showers, or forming torrents among the mountains, and rivers in the valleys, is returned to the parent ocean, and again becomes active in a similar cycle of changes.

But besides these obvious and complete changes in the state of matter connected with the evolution or absorption of heat, there are others in which similar alteration of temperature is observed, without a positive change of form.

tains the details of many interesting experiments upon the production of cold, and he considers the power of fluids in this respect, as nearly according to the degree of volatility in each. " If to this," says he, " we join the consideration that the cold is made greater by whatever hastens the evaporation, and particularly that the sinking of the thermometer is greater, as the air in which the experiment is made is warmer, if dry at the same time, I think, we may now conclude, *that the cold produced is the effect of evaporation.*"

A very curious and ingenious method of accelerating the evaporation of water, so as to produce a freezing temperature, has lately been devised by Professor Leslie. If we place a small basin of water under the receiver of the air-pump, its temperature will sink a few degrees during exhaustion. If a large surface of oil of vitriol be at the same time included in the exhausted receiver, the vapour of the water is rapidly absorbed by that fluid, the perfection of the vacuum is thus maintained, the production of vapour is extremely rapid, and the quantity of heat absorbed for its formation so considerable, as to allow of the conversion of the remaining water into ice. Other absorbents, such as dry clay, oatmeal, &c. may be substituted for the acid. The operation of wine and water coolers, and all cases in which diminution of temperature results from evaporation, are admirably explained upon Dr. Black's *Theory of Latent Heat*.

Whenever the density of a body, whether solid, liquid, or aeriform, is varied, there is an equivalent variation in its latent heat. The specific gravity of soft iron is increased by hammering, and heat is evolved during the operation. A piece of Indian rubber, suddenly extended, becomes warm. If water be mixed with oil of vitriol, the density of the water is increased, and there is a very considerable augmentation of temperature. If air be suddenly compressed, it retains its elastick state, but becomes violently heated ; on the other hand, if air be quickly rarified, there is an equivalent reduction in its temperature. In these cases, bodies are said to change their capacities for heat ; increase of density is attended with a diminution of capacity for heat ; and diminution of density with an increased capacity. The phenomena thus presented are such as the doctrine of latent heat would lead us to expect. When a fluid is converted into a solid, there is a copious evolution of heat ; when a fluid approximates to a solid state, or where its density is increased, we might expect that heat would also be evolved.¹

The last train of investigation, in regard to heat, which occupied Dr. Black's thoughts, related to the different quantities of heat contained in different substances of the same temperature, without relation to change of density or state. A reference to an experiment will, perhaps, render this point more intelligible. If, for instance, a given quantity of boiling water, surrounded with ice, in sinking from 212° to 32° melts one pound of ice, and if the same quantity of olive oil, in passing from the same to the same temperature melts only half a pound of ice, we should conclude, that,

¹ The sinking of a thermometer suspended in the receiver of the air pump, during exhaustion, and its subsequent rise upon the readmission of air, are noticed by Dr. Cullen in the paper just quoted.

although the thermometrick temperature of the two fluids is similar, the actual quantity of heat contained in the water, and ascertainable by its effects upon the ice, is twice that contained in the oil. To signify the quantity of heat thus contained in different bodies of the same temperature, the term *specifick heat* has been employed—we thus should state, from the result of the experiment alluded to, the specifick heat of water to be 2, that of the olive oil 1. Irvine, Crawford, Wilcke, Lavoisier, and several eminent Experimentalists of the present day, have engaged themselves in researches on this subject, but the inquiry originated with Dr. Black, in the year 1762.

In these limited observations upon the discoveries of Black, I hope to have rendered myself intelligible upon those main points of his investigations, which constitute the foundation of some of the most important and refined doctrines of chemical science. The distinct object of this discourse being to record the march of chemical discovery, and not to unfold the principles of the science, it would be unwise to indulge in more extended incursions upon this fertile ground, or to trace the great trunk of his researches to its extreme ramifications. But a partial glance at the facts disclosed will show even a superficial observer, the obligations we are under to the discoveries of this eminently modest and unassuming Philosopher. Of many of the most intricate phenomena of nature, they furnished new, easy, and luminous explanations; and to the arts they were of unparalleled benefit; for, by developing their connexion, not with the shadows merely, but with the depths of science, a new road was opened to their improvement and perfection.

Among the learned lookers-on of this period we discern many who, with independent and liberal minds, loved and patronized science for its own sake, and they were pleased at its rapid progress under the auspicious guidance of

Black. Others, actuated by motives illiberal and interested, countenanced sciences solely upon the selfish principle of gain; the puerile and short-sighted questions of *cui bono* was constantly on their lips; but even they have been silenced by the application of Black's discoveries.¹

¹ This may be the proper place to show in what way the views of Dr. Black's *Theory of Latent Heat* are connected with the improvements of the steam-engine—a subject upon which I must necessarily be brief, as only in part belonging to the object of this discourse. The Marquis of Worcester is commonly regarded as the inventor of the steam-engine, but his claims are not well authenticated. It is true, that, among the Utopian schemes to be found in his *Century of Inventions*, there is a dark description of a method of raising water by steam; but we can scarcely see how this was effected, nor are there any data recorded of the success of the contrivance. Be this as it may, he who barely and obscurely hints the possibility of an undertaking cannot be regarded as forestalling him who successfully carries it into execution; and the first person, who, upon decided evidence, constructed an engine for raising water by the alternate force and condensation of steam, was Captain Savary, —who also published an account of his invention in a small tract called the *Miner's Friend*. To enter into a description of this instrument would be irrelative to my present purpose; I therefore pass on to that of Newcomen, who, in 1705, obtained a patent for an improved steam-engine. It consisted of a boiler having a cylinder placed upon it, in which was a solid plunger connected by its rod with a beam and lifting pump. The plunger was elevated by the elastick force of steam admitted from the boiler. The steam-cock being closed, a small stream of cold water was suffered to run into the cylinder, by which the steam was condensed; the pressure of the atmosphere then acting upon the surface of the plunger, forced it to the bottom of the cylinder, whence it was again raised by the readmission of steam, and so on. In 1717, Mr. Henry Beighton became an improver of the steam-engine; he was probably the first who caused the steam-cock to be opened and shut by the machinery, for a man was obliged to attend Newcomen's engine for this express purpose. A few other improvements were made by different persons, but they did not affect the general action of the engine; the steam was alternately admitted into, and condensed in the main cylinder; and although defects in its power had been noticed, their cause was unknown until 1765,

SECTION IV.

RESEARCHES RELATING TO THE COMPOSITION OF ATMOSPHERICK AIR.
—EXPERIMENTS OF RUTHERFORD AND OF PRIESTLEY.

OF the various discoveries, which it is the object of this Dissertation to unfold, none have been more important in their consequences than those relating to the composition

when, happily for the prosperity of the arts and manufactures of this country, the subject engaged the keen ingenuity of Mr. Watt. The model of a Newcomen's engine fell into his hands to be repaired, and in this he presently observed the immense loss of steam occasioned by its admission into the cylinder just cooled for condensation; indeed, he went so far as to ascertain, by experiment, that half the steam of the boiler was thus lost. For, having constructed a boiler which showed the quantity of steam expended at every stroke of the engine, he found that it many times exceeded that which was sufficient to fill the cylinder. But the circumstance that excited his greatest surprise was, that the injection water gained infinitely more heat than if a quantity of boiling water, equal to that required to form the steam, had been added to it. It was probably in this dilemma that he consulted Dr. Black—and the explanation of the difficulty will be obvious from the facts detailed in the text. To avail himself, therefore, of the whole power of the steam, it became absolutely necessary to keep up the temperature of the cylinder constantly at the boiling point of water; this he was enabled to attain, by connecting with it another vessel, exhausted of air, and immersed in cold water, into which, when communicated with the cylinder, the steam, being an elastick fluid, instantly rushes and is condensed, and, on closing its connexion with the cylinder, the steam, again admitted there, now operates with full force, and suffers no further condensation. To carry off the water from this second vessel, which he calls the condenser, and to perpetuate the vacuum, Mr. Watt attached to it a pump by which both the air and condensed water are removed. The engine thus altered produced the same power as one of equal dimensions on Newcomen's plan, with rather less than one-third the quantity of steam; hence was a considerable hindrance to the use of the engine

of atmospherick air, a subject which the ancients seem not to have thought upon, since they regarded it as an element, or ultimate principle of matter.¹ In this, as in most other branches of experimental science, the advances of the human mind have been very gradual: Mayow, in 1674, was upon the very brink of that stream of discovery, which, in 1774, carried Priestley into the fastnesses of Pneumatick Chemistry. Hales, by showing the mode of disengaging and collecting gaseous fluids, removed many of the most serious obstacles which encumbered this path

materially diminished, namely, the expense of fuel. But great as was this improvement, it forms a small part of the successful achievements of Mr. Watt in this department of mechanicks; he amended the apparatus for boring the cylinders, and improved every part of the working gear of the engine; and he infinitely extended its applications and utility, by applying the power of steam to produce motion round an axis; but their enumeration would lead me out of the bounds of chemistry. I, therefore, hasten to the invention which may be said to have perfected the steam-engine. Steam had hitherto only been used to force the piston down,—it was returned by a weight attached to the other end of the beam. Mr. Watt, in 1782, constructed an engine in which steam was used to elevate as well as to depress the piston, an alternate vacuum being formed above and below it, by the condenser, as before. An engine upon this plan, executed at Mr. Watt's manufactory at Soho, near Birmingham, was first employed at the Albion Mills in 1788.

An excellent sketch of the history of the steam-engine will be found in the *Edinburgh Review*, Vol. XIII. p. 311.

¹ Thus Lucretius,—

Aera nunc igitur dicam, quid corpore toto
Innumerabiliter privas mutatur in horas :
Semper enim, quodquomque fluit de rebus, id omne
Aeris in magnum fertur mare, qui nisi contra
Corpora retribuat rebus, recreetque fluentis,
Omnia jam resoluta forent, et in aera vorsa,
Haud igitur cessat gigni de rebus, et in res
Recidere assidue, quoniam fluere omnia constat.

De Rerum Natura, Lib. V. v. 274.

of research; he was followed by Boerhaave, and afterwards by Black, who, having reached the discovery of fixed air, turned into another road of investigation. Neither Mayow, therefore, nor Hales, nor Boerhaave, nor Black, were very diligent cultivators of Pneumatick Chemistry; they had, indeed, opened the mine, but did not explore it; its treasures were reserved for those whose labours we are now about to recount, and were chiefly borne away by the diligent dexterity of Dr. Joseph Priestley.

If we trust the quotations of Rey already cited, the necessity of air, in the process of combustion, was not only observed, but inquired into by Caesalpinus¹ and Libavius,² as far back as the sixteenth and early part of the seventeenth century. Mayow insisted that a part only of the atmosphere was concerned in the phenomena of combustion, and found that air, in which bodies had burned, became unfit for the respiration of animals.³ As soon as

¹ Born at Arezzo in 1519; died at Rome in 1603. His medical works contain some scattered chemical observations, which, however, are of little importance.

² Libavius has sometimes been cited as the most rational chemical inquirer of his age, but of this character I can find no justification in his writings upon chemical subjects; they are either unintelligible, or trifling; he certainly had some merit as a contriver of apparatus, and his furnaces and distillatory vessels appear to have been ingeniously devised.

He died in 1616.

³ “Nempe animalculum quodvis una cum lucernâ in vitro includatur, ita ut aeri externo aditus praecludatur, quod facillè factu est. Quo facto lucernam istam brevî expirantem videbimus; neque animalculum diu tedae ferali superstes erit. Etenim observatione compertum habeo, animal unâ cum lucernâ in vitro inclusum, haud multò plus, quam dimidium temporis istius, quo aliàs viveret, spiraturum esse.” *Tractatus quinque*, cap. vii. He then goes on to show that an animal requires less air than that wanted for the combustion of a candle, and endeavours to prove

it had been ascertained that, in the phenomena of combustion and respiration, a portion of fixed air was generated, the extinction of burning bodies, and the death of animals immersed in air, thus rendered foul, were referred to the presence of that gaseous body, its noxious qualities having been amply proved by Black and others; and this opinion seemed to be sanctioned by the discovery, that air thus tainted by respiration and combustion, might, in some measure, be restored to purity by exposure to the action of lime water, which absorbed the fixed air.

In 1772, Dr. Rutherford, Professor of Botany in the University of Edinburgh, published a thesis on Fixed, or, as it was then called, Mephitick air, from which the following passage is extracted.¹ “By the respiration of animals, healthy air is not merely rendered mephitick, but also suffers another change. For, after the mephitick portion is absorbed by a caustick alkaline lixivium, the remaining portion is not rendered salubrious, and although

that the air in which an animal has been suffocated will not support flame. “Verisimile est autem aerem, qui vitae sustinendae inidoneus est, etiam ad flammam conflandum ineptum esse.—Quoniam ad lucernae deflagrationem majori particularum aerearum copiâ quam ad vitam sustinendam opus sit. Advertendum est autem hic loci, quod etsi flamma vitæque iisdem particulis sustententur, non tamen propterea putandum est, sanguinis massam reverâ accensum esse. *Tractatus quinque*, L. c. Mayow’s observations on the changes produced by the breathing of animals, on the air, are not less acute than those relating to the phenomena of combustion.

¹ “Sed aer salubris et purus, non modo respiratione animali ex parte fit mephiticus, sed et aliam indolis suae mutationem inde patitur. Postquam enim omnis aer mephiticus ex eo, ope lixivii caustici secretus et abductus fuerit, qui tamen restat nullo modo salubrior inde evadit, nam quamvis nullam ex aqua calcis præcipitationem faciet, haud minus quam antea, flammam et vitam extinguit.”

it occasions no precipitate in lime water, it nevertheless extinguishes flame, and destroys life.”

Thus we have traced the discovery of two gaseous fluids differing from common air : fixed air, discovered by Black, and *azote*, as it has since been called, by Rutherford. The former, a component part of chalk, and of the mild alcalis, the product of the combustion of charcoal, and of the respiration of animals ; the latter an ingredient of atmospherick air.

It would be a wearisome and unprofitable occupation to record, even in brief terms, the transactions of a set of cavilling philosophists who started up in this country, and elsewhere, about the present period of our history ; their names have sunk into oblivion, and their works were only read while recommended by novelty. Some of them I have reluctantly perused, and have found that they are rather calculated to weary the attention than to satisfy curiosity, or impart information.

I therefore hasten to one of the most remarkable and splendid epochs of chemical science, adorned by discoveries which have been rarely equalled, either in number or importance, and ushered in by a series of sterling facts and memorable investigations. The well known names of Priestley, Scheele, Cavendish, and Lavoisier, now appear upon the stage, and it will be an arduous but gratifying task to follow them through their respective parts. In this recital, a strict adherence to the dates of discoveries would neither be convenient nor useful, and I shall rather therefore deviate a little on this point, than cloud the perspicuity of my narrative, or cramp it by chronological strictness.

Dr. Priestley's character was of so composite an order as to defy brief description or superficial delineation ; he was a politician, a divine, a metaphysician, and a philoso-

pher ; and in each of these callings he displayed abilities of a peculiar and occasionally exalted description. His copious and important contributions to chemical science are the more surprising, when it is remembered that his philosophical pursuits were merely resorted to as a relaxation in his theological studies ; that his mind was under the constant agitation of controversy and dispute ; that he was too impatient for deep research, and too hasty for premeditated plans. But, with all these bars against him, he was a thriving wooer of science : he made more of his time than any person of whom I ever read or heard ; and possessed the happy and rare talent of passing from study to amusement, and from amusement to study, without occasioning any retrograde movement in the train and connexion of his thoughts.

There is another important feature in Dr. Priestley's character, which may tend to throw some light on his controversy with the French school : He possessed the strictest literary and scientific honesty ; he makes frequent mention of his predecessors and contemporaries, and enumerates the ideas which he borrowed from them, and the experiments they suggested, with more than necessary accuracy and minuteness. His attachment to Chemistry seems to have been formed at Leeds,¹ about the year 1768, and be-

¹ Dr. Priestley was born at Fieldhead, near Leeds, in March, 1733. In 1758, he went to Nantwich in Cheshire, where he established a school, and was, for the first time, enabled to purchase some philosophical instruments, in the use of which he instructed his scholars. In 1761, he removed to Warrington, whence he made regular annual visits to the metropolis, and became acquainted with Mr. Canton, Dr. Franklin, and Dr. Watson, who assisted him in collecting materials for his *History of Electricity*. In 1767, Dr. Priestley went to Leeds, where his attention was especially directed to the *doctrine of air*, in consequence of residing near a public brewery, where he amused himself by experiments on the fixed air produced by fermentation. " When I

tween that period and the year 1772, he had added several new and highly important facts to the science, which are detailed in a long communication presented to the Royal Society in the spring of that year. It is here that he relates those researches respecting the influence of vegetation upon the atmosphere, which led to entirely new views of the physiology of plants, and which displayed, in a striking light, some of those masterly and beneficent adjustments of nature, by which the different members of the creation are made to minister to each other's wants, and thus preserve that eternal harmony which marks the natural world.

As combustion and respiration were connected with the deterioration of air, it occurred to Dr. Priestley to ascertain how far the growth of vegetables might be productive of similar effects.

“ One might have imagined,” says he, “ that since common air is necessary to vegetable as well as to animal life, both plants and animals would affect it in the same manner ; and I own I had that expectation, when I first put a sprig of mint into a glass jar, standing inverted in a vessel of water ; but when it had continued growing there for some months,

removed from that house,” says he (*Memoirs of his own life*, p. 61,) “ I was under the necessity of making the fixed air for myself ; and one experiment leading to another, as I have distinctly and faithfully noted in my various publications on the subject, I by degrees contrived a convenient apparatus for the purpose, but of the cheapest kind.” Dr. Priestley's first publication on the subject was in 1772, and related to the impregnation of water with fixed air, and the same year, in the month of March, his *Observations on different kinds of Air*, were read before the Royal Society, to which body he continued to communicate his other valuable researches. In 1794, he embarked for America, and took up his residence in Pennsylvania, where he died on the 6th of February 1804.

We have here omitted all allusions to his religious opinions and controversies, referring our readers to his *Memoirs*, and to his life in the *General Biographical Dictionary*.

I found that the air would neither extinguish a candle, nor was it at all inconvenient to a mouse which I put into it.”

In experiments of this kind, Dr. Priestley points out the necessity of often withdrawing the dead and dying leaves, lest, by their putrefaction, they should injure the air; he also hints at the noxious powers of some plants, especially the cabbage, of which he kept a leaf in a glass of air for one night only, and in the morning a candle would not burn in it.¹

Dr. Priestley also extended his experiments to the influence of plants upon air vitiated by animal respiration and by combustion, and found that they in general did not only not contaminate the air, but that they actually restored to purity that which had been rendered impure by flame and breathing; and by showing that this change was effected by groundsel as perfectly as by mint, proved it independent of

¹ At the beginning of the last summer, I confined, in equal portions of atmospherick air, as nearly as possible, equal surfaces of the leaves of spearmint, cabbage, mustard, bean, pea, and the vine. The plants were all thriving, and, during a great part of the day, were exposed to the sun. The bulk of the air, which was confined over water, was not altered either by the mint or vine leaves; the pea and bean leaves caused a slight diminution, but the air, in contact with the cabbage and mustard plant, was lessened by about one fifteenth and one sixteenth of its original bulk, and it extinguished a taper, which the others did not. The duration of each experiment was 48 hours. The average of the thermometer, during the period, was 52°, and of the barometer, 29.5 inches. This is not the place to enter into any explanation of these facts, or to enlarge the account of them; they prove, however, a corroboration of Priestley's assertion, that different vegetables act very differently on the air, and may be useful in adjusting some discordant results of later experimentalists. Some plants are much more gross feeders than others, and the nature of the soil in which they grow may often be, in some degree, judged of by their flavour. Those vegetables which are of a very quick and luxuriant growth, and readily susceptible of the influence of manures, affect the atmosphere more than those whose growth is comparatively slow, and whose foliage is sparing.

the aromattick oil, to which some in their ignorance had been willing to refer it.

That actual vegetation was necessary, and the mere vegetable insufficient, he proved by exposing the pulled leaves of a mint plant to air, which were unproductive of the regeneration effected by the growing sprig.

Dr. Priestley concluded from these experiments, that the noxious air resulting from combustion, and from the breathing of the different animal tribes, formed part of the nourishment of plants; and that the purity of our atmosphere, and its fitness for respiration, were materially dependent upon the functions of growing vegetables.

Mayow in 1674, and Hales in 1724, had observed the production of gaseous matter during the action of nitrick acid upon the metals. I have before alluded to the very rude manner in which Mayow collected it. Hales ascertained its singular property of producing red fumes when mixed with common air. Dr. Priestley resumed these inquiries, and pursued them with clever activity: he found, that, on mixing one hundred parts, by measure, of common air, with one hundred of the air procured by the action of nitrous acid on copper, which he called nitrous gas, red fumes were produced, and there was a diminution of bulk equal to ninety-two parts in the two hundred; so that one hundred and eight parts only remained.

When fixed air was thus mixed with nitrous air, there was no diminution; when air, contaminated by combustion or respiration, was used, the diminution was less than with purer air; and with air taken from different situations, Dr. Priestley thought he obtained rather variable results. Hence the beautiful application of nitrous air to the discovery of the fitness of other species of air, for combustion and respiration.

It was for these discoveries that the Council of the Royal Society honoured Dr. Priestley by the presentation of Sir Godfrey Copley's medal, on the 30th of November, 1773.¹

¹ "Sir Godfrey Copley originally bequeathed five guineas to be given at each anniversary meeting of the Royal Society, by the determination of the president and council, to the person who had been the author of the best paper of experimental observation for the year past. In process of time, this pecuniary reward, which could never be an important consideration to a man of enlarged and philosophical mind, however narrow his circumstances might be, was changed into the more liberal form of a gold medal, in which form it is become a truly honourable mark of distinction, and a just and laudable object of ambition. It was, no doubt, always usual with the Presidents, on the delivery of the medal, to pay some compliment to the gentleman on whom it was bestowed, but the custom of making a set speech on the occasion, and of entering into the history of that part of philosophy to which the experiment related, was first introduced by Mr. Martin Folkes. The discourses, however, which he and his successors delivered, were very short, and were only inserted in the minute books of the Society; none of them had ever been printed before Sir John Pringle was raised to the chair of the Society." *Chalmer's Biographical Dictionary.—Life of Pringle.*

Dr. Franklin, in a letter upon the subject of this discovery to Dr. Priestley, has expressed himself as follows:

"That the vegetable creation should restore the air which is spoiled by the animal part of it, looks like a rational system, and seems to be of a piece with the rest. Thus, fire purifies water all the world over. It purifies it by distillation when it raises it in vapours, and lets it fall in rain; and farther still by filtration, when, keeping it fluid, it suffers that rain to percolate the earth. We knew before that putrid animal substances were converted into sweet vegetables when mixed with the earth and applied as manure; and now, it seems that the same putrid substances, mixed with the air, have a similar effect. The strong thriving state of your mint in putrid air, seems to show that the air is mended by taking something from it, and not by adding to it. I hope this will give some check to the rage of destroying trees that grow near houses, which has accompanied our late improvements in gardening, from an opinion of their being unwholesome. I am certain, from long

Sir John Pringle, who was then President, delivered, on this occasion, an elaborate and elegant discourse upon the different kinds of air, in which, after expatiating upon the discoveries of his predecessors, he points out the especial merits of Priestley's investigations: In allusion to the purification of a tainted atmosphere by the growth of plants, the President has thus expressed himself:

“From these discoveries we are assured, that no vegetable grows in vain; but that, from the oak of the forest to the grass of the field, every individual plant is serviceable to mankind; if not always distinguished by some private virtue, yet making a part of the whole which

observation, that there is nothing unhealthy in the air of woods; for we Americans have every where our country habitations in the midst of woods, and no people on earth enjoy better health, or are more prolific.” *Phil. Trans.* 1772, page 199.

Notwithstanding these researches, which have exposed some very curious facts relative to the chemical physiology of plants, it must be confessed that the causes of the renovation and equality of our atmosphere are yet by no means ascertained; for, although some growing vegetables do, under certain circumstances, purify the air, (by the absorption of carbon and the evolution of oxygen,) yet, when in a state of decay, they invariably add to its contamination, and a general view of the subject would induce us to conclude, that they do as much harm as good, at least, if recent experiments connected with this subject are to be considered as correct.

These are the prominent features of Dr. Priestley's first communication to the Royal Society respecting the different kinds of air, and had he bestowed no other contribution upon chemistry, the facts here detailed would have entitled him to a conspicuous place among the benefactors of the science. The paper is divided into several sections, in which he discusses the nature and properties of fixed air; of the air contaminated by the combustion of candles and of brimstone; of inflammable air; of air infected with animal respiration or putrefaction; of air exposed to the action of mixtures of iron filings and sulphur; of nitrous air; of air in which metals have been calcined, and which has been exposed to the action of white-lead paint; and of air procured by spirit of salt.

cleanses and purifies our atmosphere. In this the fragrant rose and deadly nightshade co-operate ; nor is the herbage nor the woods that flourish in the most remote and unpeopled regions unprofitable to us, nor we to them, considering how constantly the winds convey to them our vitiated air, for our relief and for their nourishment. And if ever these salutary gales rise to storms and hurricanes, let us still trace and revere the ways of a beneficent Being, who not fortuitously, but with design, not in wrath, but in mercy, thus shakes the water and the air together, to bury in the deep those putrid and pestilential effluvia which the vegetables on the face of the earth had been insufficient to consume."

Such were Dr. Priestley's researches, and such the views to which he had been led previous to the year 1773, when he undertook the examination of the air which rises from red lead, and from red precipitate of quicksilver, when those substances are exposed to heat. This, indeed, was one of the topics upon which Hales had touched before him, but it was passed over with that hasty and superficial carelessness of which his experimental proceeding furnish so many instances, and in which he so often lost the substance by grasping at the shadow.

Dr. Priestley cast his keenest eye upon the prospect now before him, and as the various objects came into view, he followed them up with more than his ordinary diligence and usual sagacity. The track he had entered upon was, indeed, of such abundant promise, as would have ensnared the attention and excited the curiosity of one less awake than our author to its interest and novelty. But he, already well initiated in the management of aeriform fluids, proceeded with a rapidity which left his associates far behind, and carried him, in proud and undisputed precedence, to the goal of discovery.

The 1st of August 1774 is a *red-letter day* in the annals of Chemical Philosophy, for it was then that Dr. Priestley discovered dephlogisticated air. Some, sporting in the sunshine of rhetorick, have called this the birth-day of Pneumatick Chemistry; but it was even a more marked and memorable period; it was then (to pursue the metaphor) that this branch of the science, having eked out a sickly and infirm infancy in the ill-managed nursery of the early Chemists, began to display symptoms of an improving constitution, and to exhibit the most hopeful and unexpected marks of future importance.

Dr. Priestley's original opinion, that all kinds of factitious air were noxious, seems first to have been shaken by observing that a candle would burn in air procured by distilling nitre in a gun barrel; but the first experiment, which led to a very satisfactory result, was conducted as follows. A glass jar was filled with quicksilver, and inverted in a basin of the same; some *red precipitate of quicksilver* was then introduced, and floated upon the quicksilver in the jar; heat was applied to it in this situation by a burning lens, and "I presently found that air was expelled from it very readily. Having got about three or four times as much as the bulk of my materials, I admitted water into it, and found that it was not imbibed by it. But what surprised me more than I can well express, was, that a candle burned in this air with a remarkable vigorous flame, very much like that enlarged flame with which a candle burns in nitrous air exposed to iron or liver of sulphur; but, as I had got nothing like this remarkable appearance from any kind of air besides this peculiar modification of nitrous air, and I knew no nitrous acid was used in the preparation of *mercurius*

calcinatus, I was utterly at a loss how to account for it.”¹

He afterwards obtained the same kind of air by exposing red lead and several other substances to heat, and made a number of well-devised experiments upon its properties.

Those who, for the first time, witness the effect of this air upon burning bodies, will best picture to themselves the emotion and surprise of its discoverer, when he plunged a burning taper into it. The splendour of the flame was magnificently increased, the consumption of the wax was extremely rapid, and the heat evolved much more considerable than in common air. He found, in short, that, in all cases of combustion, the process was infinitely more rapid and perfect in this kind of air, than in the ordinary atmosphere;² and he was thence induced to apply the term *dephlogisticated* to the gas he had thus obtained. He regarded it as air deprived of phlogiston, and thus accounted for its eager attraction for that principle which, during combustion, bodies were imagined to throw off.

¹ *Experiments and Observations on Different Kinds of Air, &c.* Vol. II. p. 107. Birmingham, 1790.

² The following paragraph, with which Dr. Priestley prefaces his account of the discovery of dephlogisticated air, presents a picture of his mind in regard to the origin of his own researches.

“The contents of this section will furnish a very striking illustration of the truth of a remark which I have more than once made in my philosophical writings, and which can hardly be too often repeated, as it tends greatly to encourage philosophical investigations; viz. that more is owing to what we call *chance*, that is, philosophically speaking, to the observation of *events arising from unknown causes*, than to any proper design or preconceived *theory* in this business. This does not appear in the works of those who write *synthetically* upon these subjects, but would, I doubt not, appear very strikingly in those who are the most celebrated for their philosophical acumen, did they write *analytically* and ingenuously.” (*Exp. and Obs.* Vol. II. p. 103.)

On the contrary, he accounted for the extinction of flame by the air discovered by Rutherford, and since termed azote¹ or nitrogen,² upon the idea that that aeriform fluid was charged or saturated with phlogiston, and he therefore called it phlogisticated air.³

In enumerating the higher merits of Dr. Priestley as a discoverer, we must not forget the minor advantages which his ingenuity bestowed upon experimental Chemistry.—He supplied the Laboratory with many new and useful articles of apparatus, and the improved methods of managing, collecting, and examining gaseous fluids, were chiefly the results of his experience. He was the first who, with any chance of accuracy, endeavoured to ascertain the relative or specifick gravities of the different kinds of air then known; he observed that dephlogisticated air was rather heavier, and phlogisticated air somewhat lighter, than that of the atmosphere; nitrous air he conceived to be nearly of the same specifick gravity. His experiments were made by the help of a delicate balance and exhausted flask.

The influence upon the respiration of animals of a species of air marked by the eminent perfection with which it supports combustion, did not escape Dr. Priestley's notice. On applying to it his test of nitrous air, he found the absorption produced on mixture greater than with atmospherick air; whence he conjectured its superiour fitness for the support of life; he introduced mice into it, and found that they lived longer than in an equal bulk of atmospherick air; he then had the curiosity to taste the

¹ From α and $\zeta\omega\eta$, "destructive of life."

² *i. e.* Producer of nitrick acid.

³ The application of dephlogisticated air to obtain intense degrees of heat, and its probable uses in medicine, were subjects which did not altogether escape Dr. Priestley's attention, and he has alluded to them in the section of the work already quoted, relating to its "Properties and uses."

gas himself, and after two or three respirations, he felt, or fancied he felt, a peculiar sensation of lightness and ease of the chest. "Who can tell," says he, "but that in time this pure air may become a fashionable article in luxury.—Hitherto only two mice and myself have had the privilege of breathing it." To this he foolishly adds, that "the air which nature has provided for us is as good as we deserve."

We have not yet exhausted Dr. Priestley's discoveries, but have seen enough to establish his claims to the title of a great benefactor to chemical science. If we compare him with his predecessor Black, he falls short in depth of judgment, but in quickness of conception, and industry of pursuit, he excels even such a standard of comparison. The one climbed the hill of discovery with slow and cautious steps, and calmly enjoyed the surrounding views; the other made a more rapid ascent, but was giddy when he reached the summit; hence those distortions and misconceptions, those erroneous notions and hasty conclusions which he who turns over the philosophical writings of Dr. Priestley cannot fail to discern.

Upon the other productions of his pen, metaphysical, political, and moral, it is neither my province nor inclination to dwell; they abound in the defects, but are deficient in the merits, of his tracts upon chemical subjects.*

From the commencement to the termination of his busy career, Dr. Priestley was a staunch supporter of the unintelligible system of phlogiston; he adopted it in all its original incoherence and absurdity; and the last of his scientific publications was a tract in its defence, in which are adduced a variety of objections to the revived hypotheses

[* It is much to be regretted, that the ingenious author should hazard this sweeping censure—a censure altogether out of place, and, as many will think, not less unfounded than impertinent.]

of Rey and Mayow, and Hooke, which having long lain dormant, were at this time erupted into the chemical world under the specious title of the French theory.¹

It will not be denied that the leading facts just detailed threw considerable light upon the nature and properties of atmospherick air ; but those who have entitled Dr. Priestley the discoverer of its composition, have somewhat overstepped the bounds of correctness.

He seems, indeed, to have possessed no just notions of the difference between phlogisticated and dephlogisticated air ; and, instead of regarding them as distinct chemi-

¹ The tract alluded to in the text was published by Dr. Priestley after his retirement to America in 1800. It is entitled, *The Doctrine of Phlogiston established, and that of the Composition of Water refuted*. It contains a variety of miscellaneous observations on the phlogistick and antiphlogistick theories, but it would be useless to follow the author into his unsubstantial speculations on these subjects. He has, however, thrown out some important considerations relating to his claims of originality as the discoverer of dephlogisticated air. The following paragraph appears of sufficient importance to be transcribed. "Now that I am on the subject of the *right to discoveries*, I will, as the Spaniards say, leave no ink of this kind in my ink-horn ; hoping it will be the last time that I shall have any occasion to trouble the publick about it." M. Lavoisier says (*Elements of Chemistry, English translation*, p. 36,) "this species of air (meaning dephlogisticated) was discovered almost at the same time by Mr. Priestley, Mr. Scheele, and myself." The case was this :—Having made the discovery some time before I was in Paris in 1774, I mentioned it at the table of M. Lavoisier, when most of the philosophical people in the city were present ; saying, that it was a kind of air in which a candle burned much better than in common air, but I had not then given it any name. At this all the company, and M. and Madame Lavoisier as much as any, expressed great surprise ; I told them I had gotten it from *precipitate per se*, and also from *red lead*. Speaking French very imperfectly, and being little acquainted with the terms of chemistry, I said *plomb rouge*, which was not understood, till M. Macquer said, I must mean *minium*. Mr. Scheele's discovery was certain independent of mine, though I believe not made quite so early." P. 28.

cal principles, adopted the notion of one elementary substance, charged, in the one instance, with the imaginary essence of inflammability, and free from it in the other. In these inquiries, he frequently verges upon more correct and refined views, but has no sooner entered the right path, than phlogiston, like an *ignis fatuus*, dances before his eyes, and leads him into the marshy mazes of error.

In the preceding investigations, Priestley followed those methods of collecting aeriform fluids over water, which Hales and others had employed before him: he now ascertained that there were some gases absorbed by or soluble in water. Mr. Cavendish, one of the most eminent Philosophers of that day, had announced this circumstance, and was puzzled by it; but Dr. Priestley, with his usual and dexterous ingenuity, overcame the difficulty, by employing quicksilver instead of water, over which fluid metal he preserved and examined several kinds of air, which are instantly deprived of their elastick state by the contact of water.

The first permanently elastick fluid of this description which he examined, was the muriatick acid; he obtained it by heating copper in the fluid acid, or common spirit of salt, and called it marine acid air.

He immediately ascertained its absorption by water, and its powerful acidity; he found it incapable of supporting flame, and extremely destructive of animal life. He examined the action of a variety of substances upon this gas, and ascertained the remarkable rapidity with which it is absorbed by charcoal, and several vegetable and animal substances. Some unsuccessful attempts were made to ascertain the specifick gravity of this gas, from which Priestley correctly concluded, however, that it was a little heavier than air.

This success attending these experiments, and the readiness with which he procured and retained the gaseous muriatick

acid, led him to extend his trials to other acids, when he found that, by acting upon vitriolick acid by inflammable substances, he could procure from it a permanently elastick fluid, to which he gave the name of vitriolick acid air; he found that, like the marine acid air, it was rapidly absorbed by water, and must be collected and preserved over quicksilver; that it was nearly twice as heavy as atmospherick air; that it extinguished flame, and was instantly fatal to animal life; that it reddened vegetable blues, and destroyed most colours. This air is, in fact, produced by burning sulphur in the atmosphere, and straw, wool, and other materials, are frequently bleached by exposing them to its fumes.¹

¹ Having elsewhere praised Dr. Priestley's candour, I insert the following extract from his history of the discovery of *Vitriolick Acid Air*, to show the exactness with which he acknowledges the hints and assistance of others:

"My first scheme was to endeavour to get the vitriolick acid in the form of air, thinking that it would probably be easy to confine it by quicksilver, for, as to the nitrous acid, its affinity with quicksilver is so great that I despaired of being able to confine it to any purpose. I, therefore, wrote to my friend Mr. Lane to procure me a quantity of volatile vitriolick acid," &c. "Seeing Mr. Lane the winter following, he told me, that if I would only heat any oily or greasy matter with oil of vitriol, I should certainly make it the very thing I wanted, viz. the volatile or sulphureous vitriolick acid; and, accordingly, I meant to have proceeded upon this hint, but was prevented from pursuing it by a variety of engagements.

"Some time after this I was in company with Lord Shelburne, at the seat of Mons. Trudaine, at Montigny, in France; where, with that generous and liberal spirit by which that nobleman is distinguished, he has a complete apparatus of philosophical instruments, with every other convenience and assistance for pursuing such philosophical inquiries as any of his numerous guests shall choose to entertain themselves with. In this agreeable retreat I met with that eminent philosopher and chemist, Mons. Montigni, Member of the Royal Academy of Sciences; and conversing with him upon this subject, he pro-

Having thus obtained permanent aeriform fluids, having acid qualities, it occurred to Dr. Priestley, that the volatile alkali, the substance which gives pungency to salvolatile, spirit of hartshorn, and similar compounds, might be also procured in a pure and isolated gaseous form; and, after several unsuccessful trials, he succeeded, by heating a mixture of quicklime and sal ammoniack, when a great quantity of air escaped, permanent over quicksilver, but, like the acid gases, rapidly absorbed by water.

The odour of this gas was pungent in the extreme, and it possessed the property of salvolatile, smelling salts, and similar substances, of turning vegetable blues to green. After several experiments, in which the absorbing powers of different substances in regard to this air, were tried, Dr. Priestley became impatient to discover the effect of mixing it with the acid airs just described,—he imagined that he should form a neutral air. On putting this notion, however, to the proof of experiment, he was surprised to observe that when marine acid air, and the volatile alkaline air, were mixed in due proportions, they were wholly condensed into a solid. And with sulphureous air a very similar result was afforded.

Dr. Priestley concluded that alkaline air was considerably lighter than acid air, because, on mixing them over mercury, he observed the former to float above the latter;

posed our trying to convert oil of vitriol into vapour, by boiling it on a pan of charcoal in a cracked phial. This scheme not answering our purpose, he next proposed heating it together with oil of turpentine. Accordingly, we went to work upon it, and soon produced some kind of air confined with quicksilver; but our recipient being overturned by the suddenness of the production of the air, we were not able to catch any more than the first produce, which was little else than the common air which had lodged on the surface of the liquor, and which appeared to be a little phlogisticated, by its not being much affected by a mixture of nitrous air."

on putting a lighted candle into alkaline air the flame was enlarged, and a portion of the air appeared to burn with flame.

We have now considered the principal discoveries of Dr. Priestley, upon which his title to originality rests, and it must be allowed that they are not less important than numerous. If we even consider them merely as insulated facts, they are of a very superiour character, and tended greatly to enlarge our knowledge of the chemical elements of matter ; but the new views of many natural and artificial phenomena, which they exposed, and which before were buried in deep obscurity, confer upon them a more exalted aspect, and have obtained for them the deserved meed of universal admiration. In perusing Dr. Priestley's tracts, we find the thread of the narrative occasionally knotted with conceit, and weakened by garrulity ; but these blemishes are compensated by prevailing candour and perspicuity of style : he had greatly extended the boundaries of science, and was awake to the importance of his conquests ; but resisted that febrile thirst of innovation and reform, which was endemick among contemporary Chemists.

“ At present,” says he, in the Preface to his third volume of *Experiments and Observations*, relating to various branches of Natural Philosophy, “ At present all our *systems* are in a remarkable manner unhinged by the discovery of a multiplicity of *facts*, to which it appears difficult or impossible to adjust them : We need not, however, give ourselves much concern on this account. For when a sufficient number of new facts shall be discovered, towards which even imperfect hypotheses will contribute, a more general theory will soon present itself, and perhaps to the most incurious and least sagacious eye. Thus, when able navigators have, with great labour and judgment, steered towards an undiscovered country, a common sailor, placed at

the mast head, may happen to get the first sight of land. Let us not, however, contend about merit, but let us all be intent on forwarding the common enterprise, and equally enjoy any progress we may make towards succeeding in it, and, above all, let us acknowledge the guidance of that great Being, who has put a spirit in man, and whose inspiration giveth him understanding." With this quotation, sufficiently characteristick of his general style, I shall take leave of Dr. Priestley, and introduce another hero of chemical history, his contemporary and great rival, Scheele.

SECTION V.

DISCOVERIES OF SCHEELE AND CAVENDISH.

AMONG those whose names became eminent in the history of chemical science during the first half of the eighteenth century, Margraaf and Bergman are entitled to particular mention. The former was a pupil of the once celebrated Neumann,¹ a man whose works are now not much thought

¹ Casper Neumann was born at Zullichau in Prussia, in 1682, and in 1705 we find him enjoying the patronage of the King of Prussia, by whom he was sent to complete his studies at the University of Halle. In 1711, he became a pupil of Boerhaave, and shortly after visited England, whence he accompanied George I. to Hanover, in 1716. In 1723 he became Professor of Practical Chemistry in the Royal College of Berlin, where he died in 1737. His works consist chiefly in dissertations on various subjects of chemical inquiry, published in the *Transactions of the Royal Society*, and in the *Miscellanea Berolinensia*. His Lectures were not printed till after his death, and proved a valuable magazine of chemical knowledge. "The author," says Dr. Lewis, who edited his works, "biassed by no theory, and attached to no opinions has inquired by experiment into the proportions and uses of the most considerable natural and artificial productions, and the preparations of the principal commodities which depend

of, but who did considerable service to the Chemistry of his day, and was evidently possessed of great diligence and some capacity. In 1733, Margraaf¹ pursued chemistry under Juncker at Halle, and, having returned to Berlin in 1738, we find several of his contributions in the *Transactions of the Scientifick Society* of that capital. Subsequent to that period, his works were collected and published at Paris in 1762. They contain a great body of information, at that time novel and important, but they are chiefly entitled to notice as furnishing specimens of the art of analysis, which was afterwards carried to greater perfection by Bergman,² who, indeed, may be considered as the first who pointed out the true objects of that branch of the science, and who aimed at conferring upon it the statical accuracy which has since rendered it so important and useful.

But Bergman was something more than a diligent experimentalist and acute reasoner ; he was also an active patron of science, and had the merit of rescuing Scheele from his obscure situation, and of discerning that talent and genius in the bud, which was afterwards so vigorously fruitful.

If we compare Scheele with our own countrymen, we discern him possessed of the accuracy and cool judgment of Black, conjoined with the inquisitive and busy activity of Priestley, and his success in the pursuit of science was

on chemistry ; and seems to have candidly, and without reserve, communicated all he discovered.”

¹ Born at Berlin in 1709, where he died in 1782.

² Torbern Bergman was born in Sweden in 1735, and died in 1784. His principal chemical papers are contained in the *Opuscula*, published at Upsal in 1779. They contain much to admire, not merely as being rich in facts and discoveries, but also on account of the general view which he takes of the mode of prosecuting philosophical inquiry, and which is so ably set forth in the preliminary essay, *De Indagando Vero*. The *Opuscula* was translated into English by Dr. Edmund Cullen in 1788.

such as might be expected to flow from this happy and rare union of opposite talents. In the number of his discoveries, their weight, and novelty, he has indeed very few equals; nor has their splendour been tarnished by time, or dimmed by the brilliant light of modern investigation.

Scheele is among the fortunate few, who, starting from an obscure original, have attained the zenith of scientific eminence. He was born in 1742 at Stralsund, where his father was a tradesman. His youthful days were passed in the house of an Apothecary at Gottenburgh, where, by singular perseverance, and that kind of industry which is prompted by strong natural inclination, he acquired a valuable stock of chemical information. In 1773, having removed to Upsal, accident brought him acquainted with Bergman, who became his friend and patron, and to whose honour be it told, that when Scheele's reputation afterwards rose to such a height as threatened to eclipse his own, instead of listening to the voice of jealousy, which, on such occasions, is too common a frailty, he became more zealous in behalf of his rival, and more indefatigable in the service of his friend. Scheele afterwards removed to Koping, in the neighbourhood of Stockholm, where he died in 1786.

No adventitious aid, however, can be said to have contributed to Scheele's greatness. On the contrary, obstacles were opposed to his progress which would have damped the ardour, and checked the flight, of less aspiring and persevering minds; and much of his useful life was spent, "not in the soft obscurities of retirement, or under the shelter of academick bowers, but amid inconvenience and distraction, in sickness and in sorrow."

Scheele's first publication, which appeared in the *Stockholm Memoirs*¹ for the year 1771, relates to the analysis of fluor spar. The peculiarities of this substance were first noticed in 1768 by Margraaf, but the discovery of the principle upon which they depend was reserved for the superiour sagacity of Scheele, who demonstrated in it the existence of lime, and acid till then unknown, which he called fluorick acid. Scheele had applied acid of vitriol with great success to the analysis of a variety of substances, and on exposing powdered fluor spar to its action in a glass retort, he obtained the new body in question. The fluorick is one of the few acids which rapidly corrode glass; it dissolves silicious earth, a component part of glass; and forms with it in an aeriform compound, permanent until it touches water, when part of the silicious earth is deposited. Scheele, not aware of this fact, at first conceived that silicious earth was a compound of fluorick acid and water, for, on evolving the gas in a glass retort, and allowing it to pass into water, every bubble was coated with a film of flint; but he afterwards learned, that it was derived from the retort, which is soon eaten into holes. It is this property of fluorick acid which has led to its employment for the purpose of etching upon glass.

Scheele was next occupied in a series of researches on manganese, a mineral substance abundant in many parts of the world, but of which the nature was unknown until the appearance of his *Dissertation* upon it in 1774. This tract is full of important facts, and glitters with brilliant discoveries. We are here first informed that manganese is a metallick calx; that in its crude state it often contains a peculiar earth, to which the name *barytes* has since been

¹ Scheele's *Essays* have been collected and translated into English by Dr. Thomas Beddoes. London, 1786.

applied ; that the volatile alcali contains nitrogen as one of its essential component parts. But the most remarkable novelty announced in this Essay, is the discovery of a peculiar gaseous fluid of a yellow colour, which Scheele considered as the basis of the muriatick acid ; conceiving the addition of phlogiston requisite to the restoration of its acid properties. This *dephlogisticated marine acid*, as its discoverer termed it, was examined by him with some precision, and many of its leading characters ascertained, especially its power of destroying colour, which has since rendered it of so much importance to the bleacher. It has since been termed *oxymuriatick acid*, and more recently, *chlorine*. Besides the valuable facts to which I have now alluded, Scheele's *Essay on Manganese* contains others of considerable interest and importance. There can be little doubt that he discovered azote about the same time as Dr. Rutherford. He obtained it by exposing compounds of sulphur, and the alcalies and earths, to confined portions of atmospherick air. He found a part was absorbed, and that the remainder, though not fixed air, was still incapable of supporting combustion. He went a step farther, and demonstrated the existence of azote in the volatile alcali or ammonia, from which he obtained it by the action of certain compounds of manganese.

For our knowledge of the method of obtaining tartarick and citrick acids in their pure state from tartar and lemon juice, we are also indebted to Scheele, and for a variety of curious and interesting documents relating to some of the metallick acids, and their combinations. A compound of one of the acids of arsenick and copper was particularly described by him, and recommended as a green pigment ; he prepared it by adding to a solution of blue vitriol, an alkaline solution of white arsenick.

His chemical tracts on the nature and properties of milk, his observations on ether, on the preservation of vinegar, on Prussian blue, and on the nature of the acid matter in various fruits, are all entitled to the highest praise. A just notion of their excellence may be formed by comparing them with the essays of the ablest Chemists of the present day: in regard to experimental accuracy and just conclusion, they generally stand this severe test; no small merit, when his humble means and deficient education are thrown into the balance against him.

But, of the various works of Scheele, that which is most decidedly characteristick of an inventive and original genius, is his *Chemical Observations and Experiments on Air and Fire*. Every page of this treatise has its merits, and they are distinct and peculiar; sometimes we are struck with the sagacity of his inductions, at others, with the appropriateness of his experiments. The facts are detailed in intelligible, clear, and distinct arrangement; the theoretical speculations are adduced with that caution and modesty which ensures attention, and often commands acquiescence. Nor is this essay deficient in original discoveries of the highest class. He obtained oxygen from manganese without any knowledge of Priestley's prior claims; he calls it *empyreal air*, and has detailed its properties and several modes of procuring it, with becoming accuracy and minuteness. Upon the composition of the atmosphere, and of metallick calces, he dwells at considerable length, and relates several remarkable facts concerning the chemical powers of the prismatick rays, and the radiation of terrestrial heat.¹

¹ In this admirable Dissertation, Scheele points out the difference between the heat which radiates from a heated surface, and that which is diffused by currents of hot air. He also shows, that terrestrial radiant heat does not pass through glass,

From one who wrote in that twilight period, when chemical philosophy was emerging from error and absurdity, we are not to expect the logical accuracy required at the present day. Scheele is sometimes hasty, and occasionally unintelligible; but seldom careless, and never ridiculous. Different men will form different estimates of Scheele's talents, and although I cannot agree with a contemporary biographer who designates him "as the brightest ornament of human nature, and the most extraordinary man that ever existed;" it will, I think, be generally admitted, that he was an acute and industrious philosopher, and an upright honourable man.

Of the Chemical Philosophers that adorned the last age, the Honourable Henry Cavendish¹ stands foremost in the first rank.

While Priestley and Scheele were extending the boundaries of knowledge, and pursuing that brilliant career of which I have just presented an outline, Cavendish was not less successfully employed in another train of investigation.

Van Helmont, Mayow, and Hales, had, by a series of crude and imperfect experiments, demonstrated the existence of inflammable aeriform fluids; but the nature of the peculiar principle to which they owe their inflammability had been but very imperfectly ascertained, till Cavendish turned his mind to the subject, and published upon it in the *Philosophical Transactions* for 1776. The paper I allude to consists of three tracts, relating to inflammable, fixed, and nitrous air. The first is chiefly entitled to

while that of the sun does; that polished glass and metal reflect both heat and light, but that both are absorbed by a surface covered with lamp black; and that the direction of radiant heat is not diverted by a current of air.

¹ Born in London on the 10th of October 1731.

attention from its originality and importance ; in the others he had been anticipated by Mayow and Black, or excelled by Priestley, Scheele, and others of his contemporaries.

By acting with dilute acids upon iron, zinc, and tin, Mr Cavendish obtained an inflammable elastick fluid. He found that it was afforded in the largest quantity by zinc, and that iron yielded more than tin ; and he particularly mentions, that the state of dilution, and quantity of the acid, provided it was sufficient to effect the solution of the metal, did not affect the quantity or quality of the air. He discovered in the gas thus obtained several characters, which at once distinguished it from the other varieties of the air then known. It was not absorbable by water, it extinguished flame, and was fatal to animal life ; but, when a candle was presented to it, it inflamed ; and, when pure, burned with a blue lambent light. It was found to be the lightest known form of ponderable matter. Mr Cavendish considered it as about eleven times lighter than atmospherick air ; but subsequent experiments have shown that, when it is rendered perfectly dry, and collected in a state of purity, it is about thirteen times lighter than atmospherick air. Compared with oxygen or dephlogisticated air, its relative weight is as 1 to 15.¹

¹ This circumstance has led to its application for filling air balloons, which formerly were made to ascend by distension with rarefied air—a large quantity of fuel became thus necessary, which was greatly inconvenient on account of its weight ; and the flame required for the rarefaction of the air inclosed in the balloon, was dangerous in the extreme—by confining inflammable air in a silk bag, of sufficient dimensions, its small specifick gravity enables it to float in our atmosphere. The first ascent, with a balloon filled with hydrogen, was performed in France by M. Charles, on the 1st of December 1783—he rose to the enormous height of 10,500 feet above the earth's surface. There is a passage in Dewynt's *Sermons*, published in

He next proceeded to examine the results afforded by burning mixtures of inflammable and common air; and found that, in the proportion of one part of the former to about three of the latter, the mixture exploded on the contact of flame; and that, when the vessel in which this inflammation was performed was previously dry, it always became moist after the explosion.

This circumstance was noticed by Macquer in 1766, and shortly after by Priestley, but that *water* was the result of the combustion, seems first to have occurred to Mr. Watt, who suggested the idea to Dr. Priestley in 1783.

In January 1784, Mr. Cavendish presented a paper to the Royal Society, entitled *Experiments on Air*, in which, after some preliminary remarks, he adverts to Mr. Warltire's experiments, related by Dr. Priestley, upon the formation of dew during the combustion of inflammable with common air, which by that gentleman was referred to the deposition of the air's moisture during its phlogistication; for by the Chemists of that period, inflammable air seems to have been considered identical with phlogiston.

The method in which Mr. Cavendish pursued this inquiry was not less new than satisfactory, and the body of evidence adduced, so conclusive as to convince the most sceptical mind of the accuracy of his deductions.

To ascertain the nature of the products of the combustion of inflammable air, he had recourse to two plans: he burned it slowly and rapidly,—in the one instance, a stream of the air issuing from a small tube, was inflamed in contact with the atmosphere, or oxygen; in the other, the two gases were mixed, and suddenly detonated; and he

1658, from which it has been concluded, that balloons were known at that early period.

found that, proper precautions having been taken to exclude extraneous bodies, the result was perfectly pure water; “it had no taste nor smell, and left no sensible sediment when evaporated to dryness, neither did it yield any pungent smell during the evaporation; in short, it seemed pure water.”¹ His grand discovery of the composition of water necessarily led to a variety of others, scarcely inferiour in importance, and it tended to the elucidation of a variety of intricate phenomena in nature and art, in which that universal fluid is concerned. It was verified and established by the analytick and synthetick researches of many modern Chemists, and it became a great organ in subverting the phlogistick doctrine.

In the synthetick experiments proving the composition of water, originally devised and executed by Cavendish, he frequently observed the production of acid matter; the water formed was sour to the taste, and reddened vegetable blues; and he ascertained that these effects arose from the presence of a portion of nitrous acid. Whence this was derived remained to be proved,—whether the elements which, in one proportion, formed water, produced, in another proportion, the nitrick acid, or whether it resulted from other causes. In a paper read before the Royal Society, in June 1785, Mr. Cavendish sets this curious and interesting question at rest, and developes the source of the acid which appeared in his former investigations. It arose from the presence of a portion of azote, which, when made to unite with oxygen, produced nitrick acid. The atmosphere has already been shown to consist of azote and oxygen,—these gases are there merely mechanically mix-

¹ *Philos. Trans.* 1784. p. 129. Inflammable air has since received the name *hydrogen*, i. e. generator of water.

ed; when they are made to combine in the presence of water, nitrick acid results.

This curious fact was proved by several experiments. That which is most simple, and most satisfactory, consisted in confining a small portion of atmospherick air in a bent tube over quicksilver, and passing the electrick spark for some hours through the mixture. A diminution took place in its bulk, the mercury was corroded, and, on introducing a solution of potash, it became saturated, and yielded nitre on evaporation, a salt composed of potash and nitrick acid.

These are the principal discoveries with which Cavendish enriched the science of Chemistry; they relate to the properties of hydrogen or inflammable air, to the composition of water, and to the constitution of the nitrick acid. They are detailed in three communications to the Royal Society; the first stands in the *Philosophical Transactions* for 1766; the other two in the volumes for 1784 and 1785.

Those who have heard Mr. Cavendish designated the Newton of Chemistry, and have only hastily perused his tracts, or witnessed imperfect illustrations of his researches, may perhaps regard him less worthy that honourable and high distinction than his contemporaries Priestley and Scheele; but a more careful examination of his writings, and a comparison of his reasoning and methods of research with those of even his most eminent fellow-labourers in science, will unanswerably support his claims, and display such peculiar and varied excellence, as must justify the highest encomiums and most elaborate eulogies which have been bestowed on his exalted name. In his philosophical proceedings, the severest scrutineer is challenged to detect a single false step, for every conclusion he has formed, every theory that he has advanced, even every sentence

he has written, will bear microscopick examination. Aware that there was no royal road to philosophick truth, he relied solely upon the light of experiment, in the path of induction, and from this he never deviates. If he excelled not his contemporaries in the number of his discoveries, he certainly equalled them in their importance, and went far before them in statical accuracy and mathematical precision: but as a Philosopher he scarcely admits of comparison; in him most of the defects of his contemporaries were absent, and their talents concentrated; he was "himself alone." In Cavendish science may boast of a follower not less disinterested than successful: his affluence was princely, and his family noble; it was therefore not the desire of distinction in society, nor the more imperious call of necessity, but the thirst for knowledge, and love of truth, that summoned him to her banners.

Mr. Cavendish did not lisp in the language of science; it was, indeed, late before he appeared as a candidate for philosophick fame. His first paper was published in the *Transactions of the Royal Society* for 1766, when he was in his 36th year, a period of life at which Black, Priestley, and Scheele, had already acquired no inconsiderable celebrity. He was not confined to Chemistry only; Electricity, and subjects connected with Meteorology and Astronomy, often occupied his thoughts and employed his pen: his last essay is on the division of astronomical instruments, published in the *Philosophical Transactions* for 1809. He was then in his 78th year, and in full possession of bodily activity and mental energy. After a few days illness, he expired on the 4th of February 1810, in the 79th year of his age.

In private life, he was unambitious, unassuming, bashful, and reserved: he was peevishly impatient of the inconveniences of eminence; he detested flattery, and was

uneasy under merited praise; he, therefore, shunned general society, and was only familiar in a very limited circle of friends. Here he bore his great faculties always meekly: his conversation was lively, varied, and instructive; upon all subjects of science he was at once luminous and profound; and in discussion, wonderfully acute.

We are now about to enter upon that period of our history at which the science was reformed and modified by the French school. Of this chemical revolution I shall endeavour to present a faithful though faint outline. I shall attempt to show the grounds of innovation, to expose the weak parts of the plan, to exhibit its merits, and to compare it with former theories. In the meantime, it may not be improper to take a rapid survey of the ground we have gone over, and to enumerate the materials already in the hands of the reformers.

In the early hypotheses respecting the phenomena of combustion, they were conceived to depend upon the separation of a peculiar principle, called by Stahl and his associates Phlogiston; but the fallacy of these views was shown by Mayow, who, with his predecessor Rey, demonstrated the necessity of atmospherick air in the process. The attention of Chemists was drawn from these subjects early in the eighteenth century, by the new train of investigation in which Dr. Black had successfully embarked, and the field of Pneumattick Chemistry, which was so eminently cultivated by Priestley, Scheele, and Cavendish, absorbed universal attention.

The ideas of the ancients concerning the Elements were now completely subverted. The air we breathe was proved to consist of two distinct aeriform fluids--the one a powerful supporter of combustion and respiration, the other extinguishing flame and exterminating life. Water, so long considered as a primitive body, had been resolved

into simpler forms of matter; in short, novelties of the most attractive kind presented themselves on every side.

The discovery of hydrogen was seized upon by the advocates of phlogiston, as supporting their hypothesis, and it was generally considered as identical with that substance, which had long been hypothetical, but was now exhibited in a tangible form. The reduction of the metallic calces, by hydrogen, was considered as a powerful argument in favour of these notions, and wherever phlogiston had been supposed to be absorbed or evolved, hydrogen seemed to play the part of that imaginary principle.

The views of Priestley and Scheele were combated by a host of petty controversialists, whose names are yet extant, but whose writings are sunk into oblivion—they brought into the field an army of words, but not a single observation, founded upon fact or experiment. Mr. Cavendish was more strenuously and respectably opposed; among those who stood up against his theoretical views, Mr. Kirwan deserves especial mention, for he laid other departments of Chemistry under considerable obligations; but his arguments and learning were of little avail against the tried and sterling facts which he questioned; they are no creditable records to the author, but serve to show the feebleness of subtilty when opposed to the strength of truth.

SECTION VI.

INVESTIGATIONS OF LAVOISIER.

AMONG the eminent scientifick characters who adorned the last century, Lavoisier has always been looked upon

with high consideration. That his talents were shining, and his career brilliant, cannot be denied; but that he has those high claims to originality which we have been obliged to allow his exalted rivals, has been doubted by the generality of historians, and denied by those who have had access to the most correct information. I shall briefly notice his most important investigations, and afterward endeavour to sketch his character as a Philosopher.

The phenomena of combustion were with Lavoisier, as with his predecessors in the field of theoretical chemistry, a leading object of attention; and the theory of latent heat, devised by Dr. Black, was assumed as the ground-work of his new views.

It has already been stated, that, during the conversion of solids into fluids, and of fluids into vapours, there is a considerable absorption of heat; and that, on the other hand, when vapours and liquids are restored to the fluid and solid form, the heat, which they contained, is evolved, or passes from the latent to the sensible or thermometrick state. These views were assumed by the French school as the basis of their theory of combustion. The gas called by Priestley dephlogisticated air, and by Lavoisier oxygen, was regarded as a compound of a peculiar ponderable basis, united to the matter of light and heat. During the process of combustion, the basis was represented as combining with the combustibile, augmenting its weight, and changing its properties; whilst the imponderable elements of the gas, the light and heat, were said to be developed in the form of flame.

Lavoisier instituted an extended and beautiful series of researches connected with this subject. Dr. Ingenhouz had devised the brilliant experiment of burning iron wire in oxygen, but had neglected any inquiry into the change suffered by the gas and the metal. Lavoisier ascertained

that the iron was converted into the black brittle substance, called *martial ethiops* by the old chemists, and that 100 grains of iron absorbed about 100 cubical inches of the gas, and increased 35 grains in weight. Hence martial ethiops appeared to be a compound of oxygen and iron.

Phosphorus was burned in the same manner. There was a considerable absorption of the gas, and it appeared that the phosphorus had sustained a precisely equivalent increase of weight.

The general conclusions deduced from these experiments were bold, but incorrect. It was assumed that oxygen must be present in all cases of combustion; that the base of the gas always unites to the burning body, and that the heat and light essential to the aeriform state of the oxygen are consequently thrown off, or rendered sensible. With regard to the necessity of the presence of oxygen, it may be remarked, that the cases are very numerous, in which bodies burn, and vividly too, independent of that principle, although it is perfectly true that, in the generality of instances, oxygen feeds the flame.

It is, therefore, more philosophical, to consider combustion, or the evolution of heat and light, as a general result of intense chemical action, and as ensuing in all cases where it may be conceived that the corpuscles of bodies are thrown into violent motion, than as depending upon the presence of any distinct substance, or ensuing from the mutual actions of any appropriate forms of matter.

But farther; there are many cases in which oxygen unites to bodies, without the evolution of heat and light, as during the gradual change of some of the metals by exposure to air. And there are numerous instances in which vehement combustion ensues, not only where there is no condensation of air, but where gaseous matter is

positively produced, as in the inflammation of gunpowder; and hence the theory of latent heat, as applied to the composition of gases, is insufficient to account for the phenomena.

Another weak part of the French hypothesis is that relating to the evolution of light, which, if derived from the gas, should be proportional to its consumption or solidification, whereas it depends chiefly on the combustible. Richter, Delametherie, and Gren, regarded the gas as affording the heat only, which is proportional to the quantity consumed; and they supposed the evolution of light to be derived from the combustible, and several modern chemists have espoused this explanation. Phosphorus emits much more light than hydrogen, but consumes less oxygen; hence we should regard phosphorus, as containing more combined light than hydrogen. This hypothesis involves several unnecessary suppositions; but these cannot be discussed without reference to subjects which are excluded by the limits of this discourse. It may, however, here be observed, how nearly the French theory of combustion agrees with that of Rey and Mayow, in referring the increase of weight of the combustible, to the fixation of air: this was the great obstacle in the phlogistick hypothesis, and Rey and Lavoisier overcame it by the same means.

Oxygen was not merely considered by the French school as necessary to combustion, but also as an essential ingredient in all acids (whence the term *oxygen*;) but there are many acids in which no oxygen can be proved to exist, and it is now known even to form a component part of the alcalies and earths. If sulphur be burned in oxygen, it produces sulphurous acid gas: if potassium be heated in sulphurous acid gas, it robs the sulphur of its oxygen, and is converted into potash; here oxygen is seen

alternately producing an acid and an alcali,—the result depending not upon the oxygen, but upon the base with which it combines.

In detailing the discoveries of Dr. Black, I was led to notice his researches concerning the production of fixed air. This gas was also examined with much attention by Priestley, Scheele, and Cavendish, and they have each made important additions to our knowledge of its sources and properties.

Lavoisier's inquiries respecting the composition of fixed air, and its production during the combustion of charcoal and of the diamond, were highly important as connected with his general theoretical views. Black had indeed ascertained that burning charcoal produced fixed air, but rested satisfied with the mere fact, and pursued not the inquiry which is naturally suggested, and which was eagerly taken up by Lavoisier at an early period of his scientific career. He burned a given weight of charcoal in a given proportion of oxygen gas confined over quicksilver, and when the vessel had cooled, he introduced a solution of potash, which absorbed the fixed air. He thus ascertained the bulk of the fixed air generated by the charcoal, and the bulk of oxygen consumed; and, by weighing the residuum of the charcoal, he found the quantity lost by its combustion. From such experiments, he was led to regard fixed air as composed of oxygen and charcoal, in the proportions by weight of about 70 of the former and 30 of the latter. Soon after the discovery of fixed air by Black, it was demonstrated by Keir, Bergman, and Fontana, to possess acid properties; hence it was occasionally termed aërial acid, cretaceous acid, and mephitick acid. Consistently with the principles of the new nomenclature, it received from Lavoisier the name of carbonick

acid, a term implying that it is composed of charcoal and oxygen; and this it has since retained.

The production of fixed air, or, as we may now call it, carbonick acid, during the combustion of diamond, is one of the most remarkable and important discoveries with which Lavoisier enriched chemical science. The destruction of this precious gem by fire was demonstrated by the Florentine academicians as early as 1690; they exposed a diamond to the focus of a burning lens, and found that it was entirely evaporated; and Francis the First, of Germany, witnessed the same phenomenon in the heat of a furnace. Lavoisier proved that the diamond underwent no change when air was excluded; and that, when ignited in oxygen gas, it produced carbonick acid; whence the inevitable conclusion that the diamond and charcoal are identical in their nature; and that the vast difference in their appearance and mechanical qualities is the result of aggregation; that the one is crystallized, the other in a less indurate form. Unprecedented as such an idea may seem, it is not only warranted by the experiments of Lavoisier and others, but also in some degree supported by analogy. Thus, when argillaceous earth, which is a white pulverulent substance, is aggregated by mechanical attraction into a crystalline form, it constitutes the sapphire, one of the hardest and least destructible of the gems. In one state, the earth is soft, and readily soluble in acids; in the other, its insolubility equals its induration: but there is one invincible anomaly relating to the conducting power of the diamond and charcoal, in regard to electricity; the former ranks among the non-conductors, the latter is a conductor; and hitherto mechanical texture has not been shown, in any analogous cases, to interfere with the power of conducting electricity.

Among those who have further explored the phenomena of the combustion of the diamond, and who have verified and extended the original views of Lavoisier, we find the names of the most eminent European Philosophers. Few subjects in Chemistry have been so eagerly pursued, and the united results of different experimentalists have rarely tallied with the precision which these researches present.¹

The discoveries of Rutherford and of Priestley, in the years 1772 and 1774, had disclosed the elements of atmospherick air, and several experiments respecting the proportions in which they are blended, had been instituted by these, and other Philosophers. In the year 1775, Lavoisier resumed these inquiries, with a masterly and decisive hand; he heated mercury in contact with a known portion of atmospherick air; it gradually acquired a red film, which after some days ceased to form, and the metal remained unaltered; he then withdrew the fire, and suffered the

¹ That the quantity of carbonick acid, afforded by a given weight of diamond, is the same as that yielded by a similar quantity of charcoal, is the great proof of the identity of those apparently dissimilar substances: this was demonstrated in the year 1796, by the refined and elegant experiments of Mr. Tennant, whose untimely loss society has lately had to deplore. Mr. Tennant was a profound philosopher, and a matchless companion,—his learning was without pedantry; his wit without sarcasm,—he was deep, but always clear; gentle, but never dull. To those who knew him not, it is scarcely possible to offer an adequate representation of his singularly pleasing and enlightened character,—by those who enjoyed his acquaintance, and partook of his social hours, his extent of knowledge, his happy and unrivalled talent for conversation, his harmless but brilliant flashes of merriment, and all his amiable peculiarities, can never be forgotten. Friendship will long continue to weep over his grave, and science to lament beside his tomb.

Mr. Tennant was born in Yorkshire in 1761, and died at Boulogne in 1815.

See *Biographical Account* of Smithson Tennant, Esq. in Thomson's *Annals of Philosophy*, Vol. VI.

vessels to cool ; he found that the air had diminished in bulk, and that the quicksilver had increased in weight ; that the loss of the former was equivalent to the gain of the latter—which had absorbed the oxygen of the air, leaving the azote unaltered. By such investigations he arrived, with tolerable precision, at the proportion in which these gases exist in common air, and found, that, by mixing forty-two parts, by measure, of azote, with eight parts, by measure, of oxygen, he produced a compound precisely resembling our atmosphere, in its power of supporting combustion and respiration, and of contributing to the calcination of the metals.

Besides these researches and discoveries, Lavoisier was the author of many scientifick papers in the *Memoirs of the Parisian Academy*. Of these a brief and hasty notice will suffice, as they relate not to the great reform of chemical theory, in which he was so conspicuous an actor, and upon which his fame and reputation have chiefly been raised.

In 1764, the French Government proposed, as a prize question, “ Which is the best method of illuminating the streets of a large metropolis ? ” It was answered by Lavoisier ; and he was rewarded with an honorary medal. In 1768, he became a member of the Academy. In 1770, he controverted a prevailing opinion respecting the convertibility of water into earth ; and, two years afterwards, published an ingenious geological essay upon the changes and stratification of the globe. In 1774, he entered upon the grand field of discovery which has occupied so much of our attention, and published an ingenious and comprehensive view of Pneumatick Chemistry. A few years afterwards, his theory of acidity, of combustion, and of oxidizement ; his experiments upon the composition of water, and of the atmosphere, and his views respecting the

nature and affections of heat, were successively presented to the publick ; and, in 1789, his work entitled *Elemens de Chimie* was given to the world. It contains a full account of his theoretical views and experimental researches.

Lavoisier was an earnest promoter of the Chemistry of the Arts. He turned his attention to the improvement of several manufactures, and his labours were rewarded by considerable success. Agriculture was with him a favourite pursuit, and he endeavoured to improve its processes by experimental research. He was an able Political Economist ; and, for a few years, filled the office of a Commissioner of the National Treasury, with honour to himself, and benefit to his country.

The moral and social character of Lavoisier was of the most estimable cast. Contemporary historians agree in eulogizing his mild, amiable, and obliging manners ; in extolling his liberality, and in praising him, as the encourager of deserving ingenuity, and the ardent patron of science and the arts.

Through the scenes of the Revolution, such a man could not expect to pass unmolested. He was rich, and therefore criminal ; virtuous, and consequently offensive. In short, because his publick character and private life were equally unimpeachable and blameless, he was marked out for destruction, and murdered upon the scaffold on the 8th of May 1794, in his native city of Paris, and in the 51st year of his age.

Upon these acts of iniquitous barbarity and inhuman treachery, equally degrading to the individual performers and to the beholding nation, it is neither my business nor inclination to dwell ; the recital of particulars would excite disgust rather than interest ; and would rather shock than inform.

We must now divest ourselves of the impressions naturally arising out of the virtues, the eminence, and the mis-

fortunes of Lavoisier, and with unmixed attention steadily reflect upon his philosophical character. By some he has been extolled as the most original, inventive, and exalted genius of his age; by others stigmatized as an universal and dishonourable plagiarist; but these are the extremes of panegyrick and malevolence, each equidistant from candour and from truth. He was doubtless an acute, sagacious, and useful Philosopher; his zeal for the welfare of science was unremitting and exemplary, and his affluence enabled him to pursue it upon an extensive and splendid scale. As an original discoverer, he bends before Black and Priestley, and was inferiour to Cavendish and Scheele; but, as a theorist, he has few equals; he was comprehensive, successful, and clear. If time has shaken his opinions, and loosened his speculations, the change must be referred to the imperfect and progressive state of Chemistry, rather than to their inherent futility. In Natural Philosophy, the systems of Pythagoras, Ptolemy, Descartes, and others, have successfully yielded to the satisfactory and apparently stable simplicity of the Newtonian doctrines; but the Newton of Chemistry is yet to come.

It must be regretted, that those who have censured Lavoisier with the uncandid and unacknowledged appropriation of the thoughts of others, have some grounds for the accusation. In bringing forward his theory of combustion, why did he smother the lucid opinions of Rey and Mayow? why refuse praise and acknowledgments to Black, and Scheele, and Cavendish? or, why appropriate the discovery of oxygen, in the face of the prior, indisputable and known claims of his friend and contemporary Priestley? These are questions we cannot now answer; but, those who have grounded harsh, indiscriminate, and severe censure, upon such accusations, have neither been animated by the independent spirit of true philosophy,

nor guided by the unbiassed love of truth. It must be remembered, that Lavoisier was never fairly confronted by these rivals and antagonists; that unintentional inadvertency often accompanies scientific ardour, that, in the eagerness of pursuit, he may have neglected that which, in a calmer hour, he would have seen, regretted, and acknowledged; and that, in the hurry of discussion and heat of controversy, he was suddenly summoned to eternity.¹

Though these considerations do not exculpate our philosopher, they must be allowed to extenuate his imputed

¹ Since writing the above, I have seen two scarce volumes of the posthumous works of Lavoisier in Mr. Hatchett's library at Roehampton. They consist, in great measure, of extracts from, and sketches of his different papers read before the Royal Academy of Sciences, but several original Observations and Essays are also dispersed among them. They, in some degree, justify the observation which I have made in the text, that, had Lavoisier lived, he would have done merited justice to his predecessors and contemporaries, for he candidly reviews their opinions, and compares them with his own; at the same time, the following passage cannot be regarded as perfectly candid towards Rey, who, as I have shown above, founded his arguments not upon hypothesis, but upon experiment.

I insert a long quotation, that there may be no misunderstanding upon the subject.

After stating the prevailing phlogistick notions entertained at that period, he proceeds as follows: "Tel étoit l'état des connoissances, lorsqu'une suite d'expériences, entreprises en 1772 sur les différentes espèces d'air, ou de gaz qui se dégagent dans les effervescences et dans un grand nombre d'opérations chimiques, me firent connoître, d'une manière démonstrative, quelle étoit la cause de l'augmentation de poids, qu'acquérirent les métaux lorsqu'on les expose à l'action du feu.—J'ignorois alors ce que Jean Rey avoit écrit à ce sujet en 1630; et quand je l'aurois connu, je n'aurois pu regarder son opinion à cet égard, que comme une assertion vague, propre à faire honneur au génie de l'auteur, mais qui ne dispensait pas les chimistes de constater la vérité de son opinion par des expériences. J'étois jeune, j'étois nouvellement entré dans la carrière des sciences, j'étois avide de gloire, et je crus devoir prendre quelques précautions pour m'assurer la propriété de ma découverte. Il y avoit à cette époque, une correspondance habituelle entre les savans de France et ceux d'Angleterre; il regnoit entre les deux nations,

failings—they should induce us rather to soften the asperities of his scientifick character, than to magnify its faults—instead of rejoicing that he was not perfect, we should

une sorte de rivalité qui donnoit de l'importance aux expériences nouvelles, et qui portoit quelquefois les écrivains de l'une ou de l'autre nation, à les contester à leur véritable auteur; je crus donc devoir déposer, le 1^{er} Novembre 1772, l'écrit suivant cacheté, entre les mains du Secrétaire de l'Académie. Ce dépôt a été ouvert à la séance du 5^{me} Mai suivant, et mention du tout a été faite en tête de l'écrit. Il étoit conçu en ces termes :—

“ Il y'a environ huit jours que j'ai découvert, que le soufre en brûlant, loin de perdre de son poids, en acquiéroit au contraire; c'est à dire, que d'une livre de soufre, on pouvoit retirer beaucoup plus d'une livre d'acide vitriolique, abstraction faite de l'humidité de l'air; il en est du même du phosphore: cette augmentation de poids vient d'une quantité prodigieuse d'air qui se fixe pendant la combustion, et qui se combine avec les vapeurs.

“ Cette découverte que j'ai constatée par des expériences que je regarde comme décisives, m'a fait penser que ce qui s'observoit dans la combustion du soufre et du phosphore, pouvoit bien avoir lieu à l'égard de tous les corps qui acquièrent du poids par la combustion et la calcination: et je me suis persuadé, que l'augmentation de poids des *chaux* métalliques, tenoit à la même cause. L'expérience a complètement confirmé mes conjectures: j'ai fait la reduction de la lithrege dans des vaisseaux fermés, avec l'appareil de Hales, et j'ai observé qu'il se dégagéoit, au moment du passage de la *chaux* en métal, une quantité considérable d'air, et que cet air formoit un volume au moins mille fois plus grand que la quantité de litharge employée. Cette découverte me paroissant une des plus intéressantes qui ait été faite depuis Stahl, j'ai cru devoir m'en assurer la propriété, en faisant le present dépôt entre le mains du Secrétaire de l'Académie, pour demeurer secret jusqu'au moment où je publierai mes expériences.”

(Signé) “ LAVOISIER.”

“ En rapprochant cette première notice de celle que j'avois déposée à l'Académie le 20^{me} Octobre précédent, sur la combustion du phosphore, du mémoire que j'ai lu à l'Académie à sa séance publique de Pâques 1773, enfin, de ceux que j'ai successivement publiés, il est aisé de voir, que j'avois conçu dès 1772, tout l'ensemble du système que j'ai publié depuis sur la combustion. Cette théorie à laquelle j'ai donné de nombreux développemens en 1777, et que j'ai porté, presque dès cette époque à l'état où elle est aujourd'hui, n'a commencé à être enseignée par Fourcroy, que dans l'hyver de 1786 à 1787; elle n'a été adoptée par Guyton Morveau, qu'à une époque postérieure; enfin, en 1785 Berthollet écrivoit encore dans le système du phlogistique. *Cette theorie*

delight in his excellence, and should estimate his character as a Philosopher, not so much by the means he employed, as by the noble effects produced.

Among many other subjects which engaged the attention of Lavoisier and his associates, that of reforming the nomenclature of Chemistry deserves to be noticed as, highly beneficial to the promotion of the science, and as tending materially to facilitate its acquisition. I am inclined, however, to think that, upon this point, too much credit has been given to the French school; rage for innovation, and not zeal for improvement, seems often to have guided the undertaking; and terms, once deemed faultless, now appear not less absurd and objectionable than the fanciful names employed by the alchemical writers.

As principals in the formation of the new nomenclature, we find the names of Guyton Morveau¹ and Fourcroy, two men who may certainly be considered as ornaments of their age and country. The former, amidst varied avocations, prosecuted Chemistry with successful diligence, and, had he given nothing else to the science, his name deserves to be transmitted to posterity, as the inventor of the means of destroying infection by acid vapours, the efficacy of which he first pointed out in the year 1773. His first essay on the reform of nomenclature was published in the *Journal de Physique* for May, 1782, and although it was strenuously opposed by the colossal power of the Royal Academy of Paris, the plan was not only afterwards approved, but prosecuted by the eminent Chemists of that metropolis. The different papers and correspondence re-

n'est donc pas, comme je l'entends dire, la théorie des Chimistes François : elle est la mienne, et c'est une propriété que je réclame auprès de mes contemporains et de la postérité."

¹ Born at Dijon in 1737. Died at Paris in 1815. See *Life* by Dr. Granville in the *Journal of Science and Arts*, Vol. III. p. 242.

lating to this subject are in many respects, curious and interesting from the difference of opinion which prevailed respecting the terms he adopted, and the ultimate benefit likely to result from the reformation.

Fourcroy¹ is a well known name in the chemical world; his works rank among the most celebrated which France has produced in the science of Chemistry, though they are sometimes deficient in candour, and sometimes in correctness. His labours were important, and his discoveries numerous, but they are in many respects, so closely interwoven with those of contemporary Philosophers, that I have deemed it expedient to wave farther notice respecting their objects and merits.

I have now brought my narrative to the conclusion of the last century, about which period Electricity began to assume importance as a chemical agent, and the *Voltaick* apparatus became a necessary implement of the laboratory. To this source, the new aspect which chemical science now wears, may principally be referred, and the historian, who shall in aftertimes record the advances that have been made in Chemistry during the last eighteen years, will excite triumphs of the human mind never excelled, and rarely equalled.—I am apprehensive that the inquisitive eye will detect several omissions in the foregoing pages, although I have diligently endeavoured to record every important event in the general history of the science. Of many who have attained deserved eminence in the exclusive pursuit of its distinct branches, no mention has been made: I have looked with attention into their works, and am well aware of their individual merits; but I should have swerved from the principal object of this Dissertation, that of recording discoveries, had I attempted even the superficial enumeration of their infinitely varied applications.

¹ Born in Paris in 1755, where he died in 1809.

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